MAY 1956
VOL. LI No. 5

41.8
M69

VETERINARY Medicine

Established 1905

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features in this issue...

Swayback in Lambs—A Demyelinating Encephalopathy

Bovine Ketosis Complex

Official Poultry Inspection Programs

Critical Tests with Piperazine as an Ascaricide in Swine

Some Nervous Disorders of Horses and Cattle

General Anesthesia vs Local Anesthesia in Small Animal Practice

Use of Newer Corticosteroids in Animals

Some Current Therapeutic Agents in Veterinary Medicine

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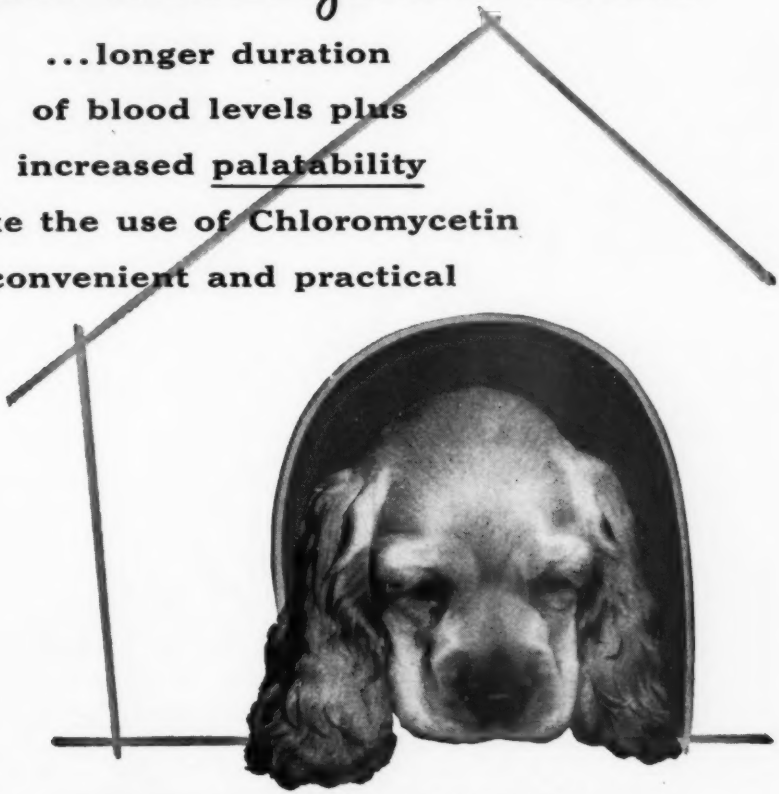

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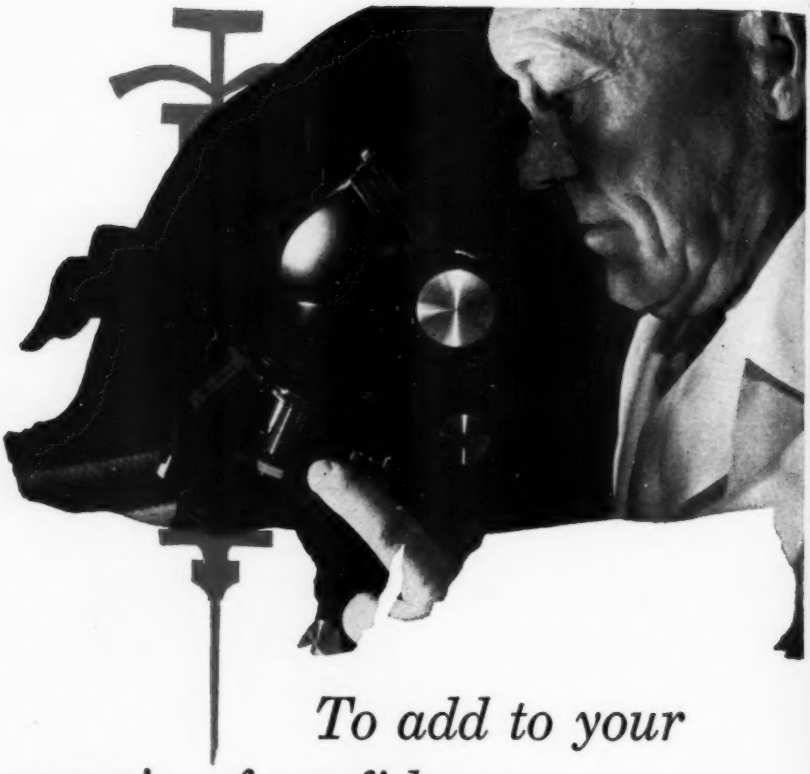

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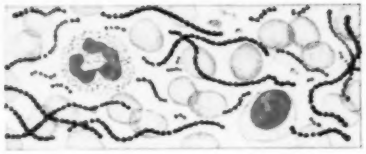
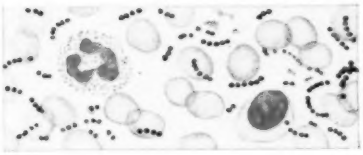
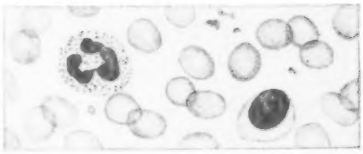


broadest anti-infective activity



for therapy at the pathogen level



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A Case for Current Veterinary Literature

Unless veterinarians are made acquainted with new developments in the professional field, all research and developmental efforts are loss. In such a case, the veterinarian perhaps is not the principal loser--his client and the livestock industry suffer most.

In this journal and others, emphasis has been placed repeatedly in recent years on the amazing progress of the pharmaceutical and biological industries. No sooner is a product born of research, tested, proved, produced in quantity, and offered for sale than it is made obsolete by further research of the same group. The whole process is repeated again and again.

The business formula of industry is to turn a share of earnings into research for the development of new products and methods to meet new challenges arising constantly. This search is deliberately designed toward perfections which may mean ruthless obsolescence for a product of only recent development and which was produced at great financial cost (or loss) and the energies of many. Processes of manufacturer quickly become obsolete too. Manufacturing cost of penicillin was prohibitive only a few years ago. No longer than seven years have elapsed since a group of hormone compounds were demonstrated as having efficacy. Production costs since that time have been so reduced that these agents now are practical tools for veterinarians.

Thanks are due drug manufacturers who have made and are still striving for more effective agents. It has added to the cost of products. The value, however, can not be judged by the figures on the price tag. How can manufacturers get information of useful products to practitioners promptly? Veterinary journals are conscious of their role in postgraduate education. They strive to interest and encourage readers to peruse materials carefully assembled and attractively presented for them. Advertisers in these journals also strive to get a new story over briefly and concisely, and to encourage consideration of those items that have prospects of being improvement over current methods or products. It is good horse sense to drink at the trough provided. It is economical to do so, and an absolute necessity if a conscientious effort is made to prepare oneself to render the best possible service to clients and friends.

VETERINARY Medicine

Established 1905

Registered in U. S. Patent Office

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- Write-Phone-Wire for immediate, careful shipment. Attractive discounts on these products when ordered in quantities of one dozen or more of each unit.

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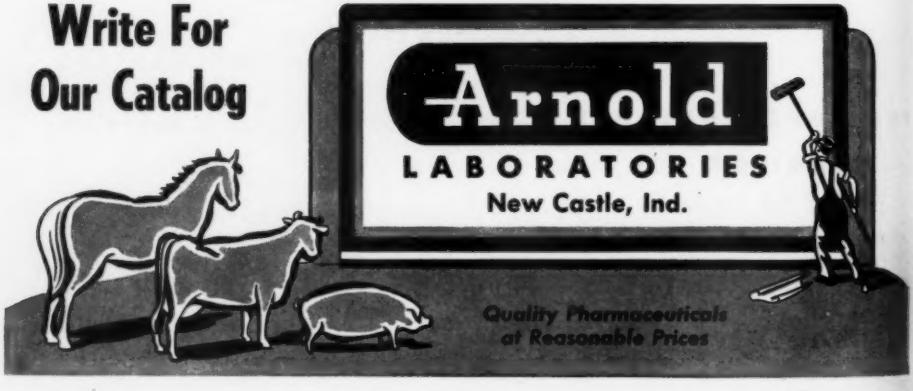
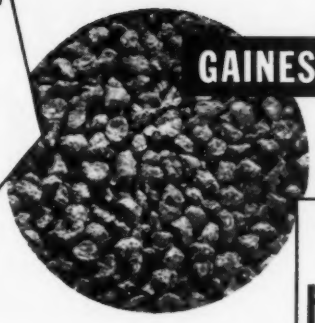


the big difference here...



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2. **As a primary treatment for swine bacterial enteritis in herds showing no systemic reaction.**
3. **As a complementary treatment for swine bacterial enteritis in herds showing systemic reactions.**
4. **To minimize relapses.**
5. **To minimize stunting effects following the outbreak of systemic diseases.**

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Tetracycline Hydrochloride Veterinary

Drug of choice

for parenteral use. Broad spectrum antibiotic, well tolerated, rapidly absorbed.

MYSTECLIN

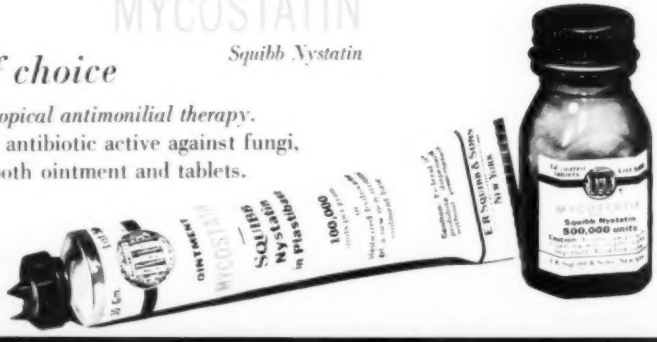
Tetracycline with Mycostatin (Nystatin)

Drug of choice

for oral administration. Broad spectrum antibiotic therapy combined with protection against monilial superinfection.

MYCOSTATIN

Squibb Nystatin



Drug of choice

for oral and topical antimonilial therapy. The first safe antibiotic active against fungi, available in both ointment and tablets.

STECLIN

(Tetracycline Hydrochloride Veterinary)

PHARMACOLOGY: Steclin is a broad spectrum antibiotic—remarkably well tolerated—highly effective against gram-positive and gram-negative bacteria, spirochetes, rickettsias and certain viruses in domestic animals. Steclin is promptly absorbed into the bloodstream, rapidly diffuses into various body fluids including the cerebrospinal, peritoneal and pleural, and produces high levels in the urine.

INDICATIONS: Canine Leptospirosis, Strangles, Shipping fever, Pneumonia, Calf scours, Necrotic laryngitis, Secondary infections concurrent with most viral infections, Necrotic enteritis, Chronic respiratory disease of chickens, Metritis, Cystitis, Mastitis.

SUPPLY:
Capsules: 50, 100, 250 mg.

Intramuscular: 100 mg., 1 gram, 2.5 grams.

Intravenous: 250 mg., 500 mg.

DOSAGE: *Oral: Small animals*, 25-50 mg. per lb. of body weight per day in divided doses

Large animals, 5-10 mg. per lb. of body weight per day in divided doses

IV or IM: *Small animals*, 5 mg./lb. daily.

Large animals, initially 2 grams followed by 1 gram daily for 3 or 4 days or until recovery.

MYSTECLIN

(Tetracycline Hydrochloride Veterinary with Mycostatin)

PHARMACOLOGY: Mysteclin combines two important antibiotics for safer therapy: Steclin for wide anti-microbial activity with fewer side effects; Mycostatin (Nystatin) for prophylaxis against overgrowth of Candida albicans (monilia).

Mysteclin thus provides broad spectrum antibiotic therapy with protection against intercurrent monilial infections which often accompany or follow the use of antibiotics lacking antifungal activity. Many of the troublesome symptoms of monilial overgrowth, such as diarrhea, anal pruritus, vaginal moniliasis, are avoided when Mysteclin is the drug of choice.

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DOSAGE: *Small Animals*, 25 to 50 mg. of Steclin Hydrochloride per lb. of body weight per day in divided doses; *larger animals*, 5 to 10 mg. of Steclin Hydrochloride per lb. of body weight per day in divided doses.

MYCOSTATIN

(Mystatin)

PHARMACOLOGY: Mycostatin is today's first safe antifungal antibiotic active against Candida albicans (monilia) in the intestine, mouth, vagina, on the skin and systemically. Mycostatin is drug of choice for prevention and treatment of monilial overgrowth often resulting from therapy with broad spectrum antibiotics lacking antifungal activity. (Broad spectrum therapy and antifungal prophylaxis can be given simultaneously with MYSTECLIN).

ORAL TABLETS: *Indications*—diarrhea, flatulence, distention, anal pruritis when caused by Candida albicans. *Supply*—bottles of 12 and 100, each tablet containing 500,000 units of Mycostatin. *Dosage—small animals*, 1 tablet twice daily; *larger animals*, 2 or more tablets twice daily.

TOPICAL OINTMENT: *Indications*—Mycostatin Ointment provides highly effective antibiotic therapy for all fungus infections of the skin caused by Candida albicans. *Supply*—30 gm. tubes, each containing 100,000 units Mycostatin per gram of Plastibase®. *Dosage*—Apply directly to monilial lesions once to several times daily until healed.

STECLIN, MYSTECLIN and MYCOSTATIN are available upon prescription from your pharmacy, through your wholesaler, or from your favorite veterinary supply house. For further information about these or other Squibb veterinary products, write: SQUIBB *Veterinary Products Department*, 745 Fifth Avenue, New York 22, N. Y.

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MORE HELP

for good cow milking

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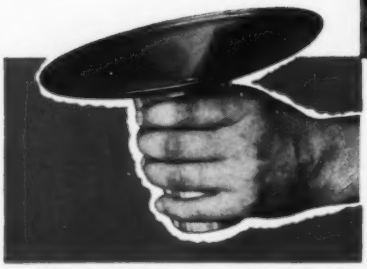

Good cow milking starts with a couple of squirts from each teat onto a modern plate-type strip cup. Telltale mastitis flakes are easy to detect on the phonograph-like rings.

Good cow milking ends when the operator gets the teat cups off each quarter immediately after the machine gets done. Every time a good cow goes to the butcher's block, the chances are that somebody left a milking machine on too long.

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- *Confers solid immunity.*
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SOLID IMMUNITY

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• Safe, too, for pregnant sows • Can't spread hog cholera • Does not throw pigs off feed • No virus setback • Economical to use.

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...they're sold on the results Fort Dodge's great new broad-spectrum bactericide delivers.

Few veterinary drugs have received such nationwide acceptance within 9 months of introduction as has Nolvasan. It has been proved the most effective of all bactericides — more efficient than antibiotics, other chemicals, or other disinfectants. Nolvasan is nonirritating and of low toxicity, yet so powerful it may be diluted 10,000 times and still be equal to 5% phenol in bactericidal activity.

New! *For treatment of sterility*

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CAP-TABS
SUSPENSION

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For convenient administration and optimal results.

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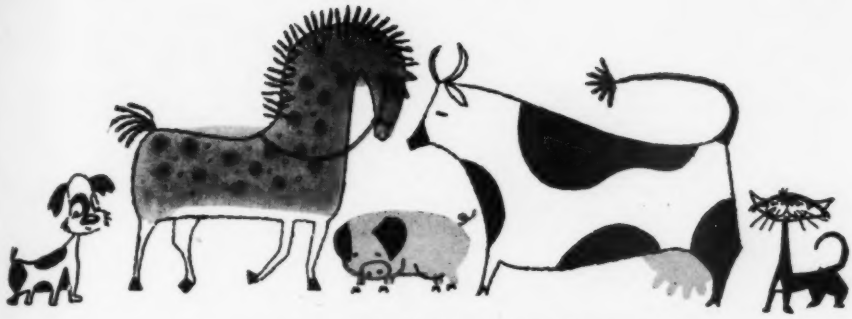

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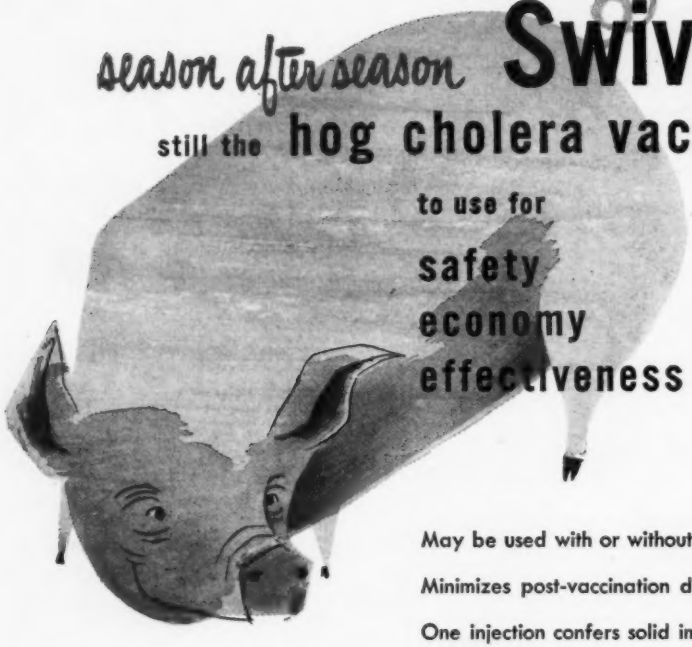

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Swayback In Lambs (A Demyelinating Encephalopathy) And Its Possible Occurrence In The United States

J. R. M. INNES,* Sc.D. (Cambridge), D.Sc. (Edin.), Ph.D., M.R.C.V.S., F.R.S.E., Baltimore, Maryland

IN Britain, around 1930, there were three neurologic diseases known to affect sheep, *viz.*, gid (cerebral coenuriasis), louping-ill, and scrapie, the nature of the first two mentioned having been somewhat defined. There was no other defined disorder of the ovine nervous system in other parts of the world, except rabies and rare, inherited malformations. As a result of investigation, and not perhaps because "new" diseases have sprung into existence, the following have been defined in addition of the above four: (a) Bacterial meningo-encephalitis (listeriosis)[1], (b) swayback (see directional bibliography), (c) cerebrospinal nematodiasis[2] (including the neurofilariasis in the United States[3]), (d) forms of cerebellar atrophy[4], (e) focal spinal symmetrical poliomalacia in Kenya[5], (f) symmetrical cerebral malacia in sheep in New Zealand (Hartley, 1954 private communication), and (g) so-called Rida in Iceland which is reputed to be a unique viral chronic encephalomyelitis[6]. To the list we should then really add the nutritional myodegeneration (alphatocopherol deficiency) — so-called muscular dystrophy, white muscle, or stiff-lamb disease—for it also produces locomotor disturbance.

The intrinsic difficulties attached to definitive cliniconeurologic diagnosis of affected sheep (or indeed any domesticated animal) must always be stressed; consequently, unless adequate study is made of the pathology of any suspected neurologic case, some of the above could be confused on clinical grounds alone. There are some pathognomonic pointers related to geographic location of the diseases, and to the fact that different age groups are affected (*e.g.* the diagnosis of rabies in sheep in England and Australia need hardly be currently considered).

A resumé of the work on swayback is given, for the benefit of veterinarians in America, who may never had heard of swayback, or may not have read the original contributions of many years ago.

Swayback† was known as a disease of lambs to farmers in Britain for over 100 years before its nature was established in 1935. The disease was called by other local names† which signified merely a weak back, or an inability to walk. Many problems on pathology and pathogenesis still remain unsolved, nor is the cause truly clarified; a method of prophylactic medicinal control was discovered (*i.e.* mineral supplements containing copper) and which in turn led to lessened interest—an unfortunate issue of many "successful" animal disease research projects.

*All the studies by the writer were done while working in the Institute of Animal Pathology, Cambridge University, England, and between 1934-1939. Present address: Chief of Pathology, Cml. C. Medical Laboratories, Army Chemical Center, Md.

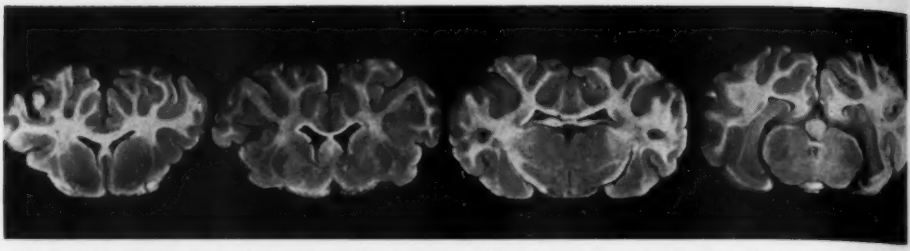

Fig. 1. Brain—Normal. Lamb, two-days-old. Coronal sections, frontal to occipital poles, left to right, for comparison with swayback lesions. About natural size. Note clear demarcation between grey and white matter.

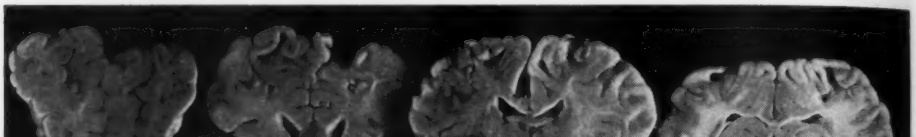

Fig. 2. Swayback. P. M. No. 17/38. Lamb affected at birth and killed when six days of age; the twin to this lamb also affected, died a few hours after birth and showed a grade of lesion pictured in fig. 3. Diffuse bilateral gelatinous degeneration of cerebral hemispheres with blurring of demarcation between grey and white matter. The stage is regarded as one proceeding, in time, to that illustrated in 3 and 4. About natural size.

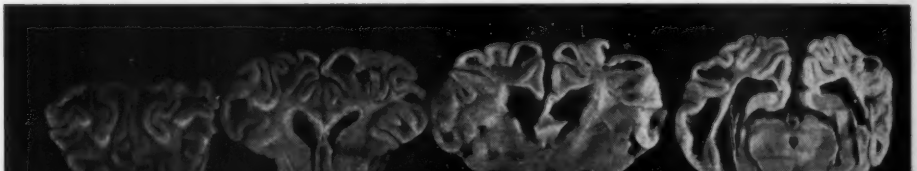

Fig. 3. Swayback. P. M. No. 16/38. Lamb affected at birth, died when two days of age. Appearance regarded as intermediate between that in figs. 2 and 4. Diffuse degeneration in cerebrum, with gelatinous change in frontal poles and liquefaction and cavitation starting in occipital region. About natural size.

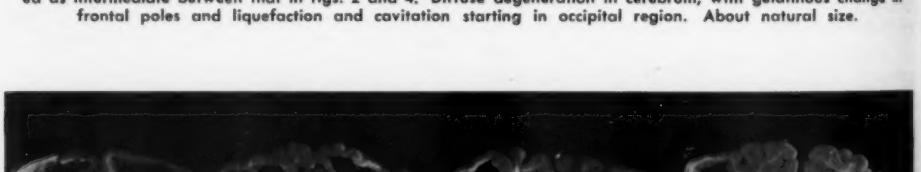

Fig. 4. P. M. No. 15/38. Lamb affected at birth, died at five days of age. Extensive gross bilateral and symmetrical degeneration with cavitation of cerebral hemispheres; wasting of corpus callosum, relative preservation of grey matter; secondary dilation of lateral ventricles. About natural size.

The disease was a form of paralysis in lambs of any breed in many parts of Britain; although occasionally referred to as being idiopathic, it is almost certainly not so. The incidence was high in some parts, often in consecutive years, whilst in other regions the disease took an annual low toll; yet annual variability in incidence in any one area was notorious, and sudden explosive-like outbreaks certainly occurred more than once, which almost had the hall-marks of some acute infections.

Paralytic lambs were born from healthy mothers, were of either sex, and could be single, twins, or all three triplets. Ewes gave birth to healthy or affected lambs in successive years. Clinically, there was ataxia and spastic paralysis, progressive except in the very mildest cases, and no fever. Lambs were born either paralytically helpless, or walked with a staggering gait, collapsing frequently; blindness was common. The affected animals could, however, bleat, suck, swallow and be kept alive by bottle-feeding. Under natural conditions acute cases died in a few days, from malnutrition, starvation, or secondary infection, but most of them were killed by the farmer a few days after they were noted to be paralyzed. Milder cases did not show signs of leg weakness and staggering perhaps for some few weeks, and might retain a residual limb weakness throughout life, but still be used for breeding.

The pathology was defined as a form of symmetrical cerebral demyelination (of varying severity in different cases). In the mildest type only microscopic changes were detectable; in other lambs macroscopic areas of gelatinous degeneration were present; in more severe cases there was diffuse bilateral softening and microcavitations, while in the worst cases the whole of the hemispheric white matter was liquefied and grossly cavitated, almost like a polyporencephalic brain, but the disease is *not* true porencephaly. The grey matter was relatively well preserved; inflammatory cell infiltrations and inclusion bodies were absent. Chromatolytic changes were present in the cells of the red nucleus. There was an almost constant secondary degeneration of the spinal cord affecting the presumed pyramidal and rubrospinal (motor) tracts. Photographs of the naked eye appearances in a few cases are appended (figs. 1-4).

At that time (1937), it was concluded that the disease had an antenatal onset (severe brain lesions were seen in late fetuses and in innumerable newborn lamb cases), and began when fetal myelination normally would become highly active, *i.e.*, about the last month of gestation. Early in the study it was apparent that the causative agent had no gross ill-effect on the general health of the mother, and certainly not on the more mature nervous system of the adult sheep. An explanation of this still eludes us, and also why there was such regional selectivity of action of the etiologic factor on different parts of white matter of the lamb nervous system (*viz.*, cerebrum and not midbrain or cerebellum). The possibility of swayback being an infection was exluded early in the studies, while another consideration that it was a form of congenital lead poisoning was investigated and dropped. It was suggested in 1935 that there might be some analogy of swayback with Schilder's encephalitis in children.§

Bennetts in 1932 (West Australia) had described a similar clinical disease of lambs, referred to it as "enzootic ataxia" and demonstrated the tract degeneration in the spinal cord; the true pathological identification of the Australian lamb disease did not come until after the work in England. In 1937, Bennetts showed that the disease was bound up somehow with a copper deficiency, because mineral supplements, containing copper, given to pregnant ewes (pastured on land known to produce a high incidence of paralyzed lambs) prevented the disorder. In Britain the same effect of copper was confirmed in 1938-39, and "chemotherapeutic" prevention became a practical measure. *No new facts have been elucidated since*, to show how copper deficiency

†The common (stable) names of many animal diseases are strange, but many are highly picturesque, and recall some bygone, shrewd observation. They would be difficult to obliterate, but they have caused confusion — twice in the literature louping-ill has been confused with swayback. The "Evil" meant many different maladies; swayback was known in Derbyshire as "Warfa", the meaning of which is lost in obscurity; it was also called swingback, jink-back, and belland [because of beliefs by farmers that it was lead poisoning, for the word (and bellium) originally had some connotation with the fine dust of lead ore]. Staggers covered a host of ills. Louping-ill (neurotropic virus encephalitis of sheep) comes from the Scottish word meaning to leap — a convulsive illness, sometimes also called trembling. Distemper, "gid" (Coenurus infestation of the nervous system), "pulpy kidney" (*Cl. welchii* infection in sheep), "daft lambs" (cerebellar atrophy) are a few other examples. "Scrapie" of sheep designated the intense scratching due to the pruritus.

§Winkelman and Moore (1942)[7] (see also Mackay (1940)[8] described cases of Schilder's disease in infants of antenatal onset and with severe subcortical demyelination to the extent of hemispheric cavitation. They compared the lesions with those in swayback, suggested some relationship, and thought that many other similar cases might have occurred, been recorded and buried in the literature under obscure titles. As a pointer they cited a case of Brocher (1912)[9] of so-called "polyporencephaly" in a child (see also Lumsden (1950)[10,11,12].

of pregnant ewes causes cerebral damage of the lamb *in utero*.

The same disease occurred in Peru as far back as 1911, where it was called "renguerra", and caused losses of even greater severity than that ever known to occur in England, where at one time it was estimated to be about 30,000 lambs a year. Tabusso in 1942 (who had made the field observations in Peru in 1911) described lesions in renguerra identical to those established for swayback, and showed that copper supplements controlled the incidence. The same neonatal disease was said to occur in the alpaca, vicuna, llama, and guano in South America, although there was no study made of the nervous system which would substantiate this fully. Yet, it is interesting that these animals are also herbivorous ruminants, carry wool, have an extremely long gestation period, and the young have a similar precocious development of the nervous system as in lambs, for the young also can walk at birth. All of these factors may be an essential background for development of the swayback picture. Swayback was reported later in New Zealand, in South Africa, and more recently in Iceland. The paralysis of young lambs reported at one time from Sweden and India is only suspect, because pathological studies were never completed, and the danger of clinical confusion of distinct neurologic entities in animals cannot be minimized. The disease has not been recorded to occur in this country, although copper deficiency areas are known and stated to result in peculiar joint manifestations in cattle in Florida.

Swayback is clearly related to one of several trace element deficiencies which affect domestic animals in curious ways, and with a global distribution. One urgent need is for still more meticulous definition of the associated syndromes in animals. Such deficiencies may often be multiple; for example, cobalt and its associated anemia occurred along with copper deficiency and cerebral demyelination of lambs in Australia, but this was not found to be the case in Britain. There is a great variation in the effect of the lack of the same trace element on different domesticated species. In Britain (until very recently) no manifestation of copper deficiency has been identified other than swayback in lambs, but in Holland, deficiency of this element in cattle resulted in marasmus, greying of hair, pasture diarrhea, and other signs, yet apparently no swayback-like disease in cattle or sheep. In Britain, however, a copper deficiency syndrome is now recognized in cattle but is associated with a high molybdenum intake. In Australia, the first sign of copper lack in sheep was reported to be loss of crimp in the wool — "steely or stringy wool", but these names were totally unknown in the wool trade in Britain around 1935, and the writer does not know whether the position has been changed since. Bennetts subsequently described, (a) "posterior paralysis" in pigs said to be cured by limonite and copper, and (b) so-called "falling disease" of cattle associated with myocardial degeneration, fibrosis and cardiac catastrophe, ascribed to be due to copper deficiency (see Bennetts, 1955).

Marston, Lee and McDonald (1948) recorded field experiments on large groups of sheep kept under natural conditions on the shell-sand littoral of South Australia, known to be copper and cobalt deficient. When given copper and cobalt the ewes grew naturally and produced normal lambs; cobalt deficiency caused an aplastic anemia uninfluenced by copper, but under such circumstances the lambs were normal if the mothers survived. In copper deficiency, wool changes were noticed first in adult sheep, later the ewes developed a fluctuating macrocytic anemia and at death hemosiderosis was a prominent lesion, while ataxic lambs were born if the ewes survived. In one ewe, copper deficient for 195 weeks, neurologic signs indistinguishable from swayback appeared, and comparable lesions were found in the brain and cord, which is the only record of swayback in any adult animal. The optimum requirement of copper for sheep on this land in Australia was found to lie between 5-10 mg. per day in the food.

Demyelination in lambs, as recognized in Britain, Australia, South America, New Zealand, South Africa and now Iceland, has a clear link with copper deficiency in the pregnant ewe, but without any lucid explanation of pathogenesis. The disease has no pathologic counterpart in any other domestic or laboratory animal, but bears comparison with Schilder's encephalopathy in infants, which in itself does not infer any causal connection. There is an obvious difference in sensitivity to copper lack (and to many other etiological factors producing neurologic diseases) between the white matter of the young, and of the adult, animal or human brain. The one recorded case in an old ewe (Australia) indicates surely if deprivation of copper is severe and prolonged enough, then demyelination in the adult might ensue. In adult sheep (in Australia) the wool and the blood-forming organs are more sensi-

tive than the nervous system to copper deficiency, because in affected, adult ewes along with the steely wool there was a macrocytic hyperchromic anemia which could fluctuate for years. There can, however, be no real comparison with human pernicious anemia, and its complex of subacute combined degeneration of the cord as was once suggested; in the sheep the anemia is not necessarily fatal, the neurologic lesions in swayback are quite different from those in human subacute combined degeneration, and the two anatomic lesions do not exist side by side in same animal, because it is the blood which is affected in the ewe and the brain in the unborn lamb. We still do not know whether the active factor essential for myelination is copper, or some copper-containing complex synthetized by the sheep, but the deficiency does not appear to be one of the element *per se*.

This essay, with illustrations of the naked-eye lesions of swayback as it has occurred elsewhere in the world, has been published for the general interest of veterinarians and pathologists who have some practical concern with sheep diseases. In this connection, it might also be said, that Dr. Hadleigh Marsh (in 1951) informed the writer that he had seen swayback in lambs very many years ago near Helena in Montana, but unfortunately the observations were never published. Consequently, it would appear a virtual certainty, if copper deficient areas do exist in the United States and involve sheep rearing regions, that swayback must have been present at some time or other.

For the discriminating reader who has an interest in the demyelinating disease problem, and most veterinarians do by virtue of the importance of this class of disease occurring in dogs, perhaps a few other comments and references might be advantageous. There is an enormous body of information on the whole of the topic of demyelinating diseases in the Proceedings of the First International Congress of Neuropathology held in Rome, 1952[18]. It is clear the entire problem is still in the melting pot, whether we refer to the mystery of the origin (and mechanism involved), of classical multiple sclerosis in man, of swayback in lambs, or of the demyelinating process seen in many cases of canine encephalitis. Examination of the photographs in the present article by any worker, be he pathologist or of some other veterinary calling, will almost certainly provoke issues concerning whether the process is truly a demyelinating one, a congenital myelin aplasia, a symmetrical liquefying malacia or a multiple of these. The mechanisms underlying analogous, or identical, processes in human infants and new-born children have been fully discussed by Lumsden[10,11,12]; his views are refreshing to read in outlook and analysis, and should be read by all those interested in demyelinating diseases in lambs, dogs, horses, or infants. More recently Towbin (1955)[14] has discussed multicystic softenings in infants with particular reference to cerebral palsy, and to the now established occurrence of cerebral defects in infants born from mothers who had suffered from rubella in early pregnancy. Finally, we often hear a saying about the reaction of the brain being limited, the same process being caused by different etiologic agents, but this must not be allowed to take on the halo of a cliché.

The term "demyelination" was applied to conditions in animals years after its recognition as an entity in human pathology, but since then there has been a slight tendency to apply it a little indiscriminately in veterinary pathology. All lesions in canine encephalitis, for example, are not demyelinating, and tract degeneration in the cord may only be a secondary phenomenon. Demyelination as a process can certainly be caused by a great variety of agents (chemical, allergic, and viral); this does not mean that an exact replica of a natural neurological process in an animal can be reproduced in all its intricate clinico-pathological pattern by two totally divergent causes. Indeed, when a careful analysis is made, maybe the brain is far less limited in its reaction than the kidney (c.f. the some 60 "causes" being listed as factors in production of so-called lower nephron nephrosis, or tubular necrosis, in man).

No matter what the demyelinating disease is, whether of man, animals or the experimental animal, we still have no clue regarding the nature of the chemical process involved, nor of the role of enzymes. There is much food for thought in the contemplations of Lumsden[19]; who says the most significant fact emerging from recent studies is that the myelin lipids are clearly synthesized locally in the nervous system and are in a constant state of turnover. It may be thus that the disease problem is not so much that of demyelination, but one relating to interference of the normal resynthesis of myelin in this turnover. For those interested, the book by McAlpine, Comptson, and Lumsden, although dealing with human multiple sclerosis (which still is the most important neurologic problem in man) is highly

recommended as a source of information from many angles.

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Profits from Pork

Because of low prices for market swine many producers will feed more grain of which an abundance is available on farms, and less than adequate amounts for prime gains of high cost supplements. This practice is likely to reduce further already narrow profit margins.

It is most important now for the swine producer to study carefully ingredient prices and utilize the most efficient and economical feeds available to grow out and market swine at the minimum cost-per-gain figure possible if he is to realize a profit on operations.

Management factors as well as those of disease control might profitably be strengthened instead of relaxed, as they are almost certain to be, in the face of low market value of slaughter classes of swine.

Bovine Ketosis Complex†

MELVIN J. SWENSON,* D.V.M., M.S., Manhattan, Kansas

KETOSIS or acetonemia of cows is a metabolic disease characterized by loss of appetite, drop in milk production, rapid loss in weight, and low blood glucose values. The presence of excess ketone bodies (beta-hydroxybutyric acid, acetoacetic acid, and acetone) in the blood, urine, milk, and skeletal muscles is often used in diagnosing this disease. The exact cause of bovine ketosis is unknown. Numerous treatments have been employed. It is often difficult to evaluate treatments properly due to the lack of control animals since many uncomplicated cases recover without treatment.

This paper deals essentially with uncomplicated or primary ketosis of cattle. However, primary ketosis becomes complicated frequently with other diseases which adds to the complexity of this metabolic disorder. According to Fincher[5] diseases that complicate or are confused most frequently are metritis, traumatic gastritis with peritonitis, indigestion, leptospirosis, postpartum hemoglobinuria, displaced abomasum, mastitis, listeriosis, and pyelonephritis. At times acetonemia complicates cases of milk fever following parturition. The veterinarian must be able to diagnose these diseases as well as ketosis. Frequently one finds that cases of ketosis which fail to respond to treatment or require additional treatment are complicated by concurrent or precipitating infections.

During the past 20 to 30 years, ketosis has become a major problem of dairyman. Geneticists have bred and inbred cows to reach maximum milk production at the expense of physiologic status. For example, the average yearly milk production of dairy cows in the United States is 5,000 lb. yielding 200 lb. of butterfat. It is recommended often, to dispose of all dairy cows producing less than 350 lb. of butterfat annually. The record milk producing cow* in the United States gave 42,805 lb. with 1,246.4 lb. of butterfat during a single lactation. The record for butterfat** is 1,511.8 lb. from 36,414 lb. of milk. Dairymen like to have cows produce 500 to 600 lb. of butterfat yearly. At the same time, the incidence of ketosis is greater in these herds when compared with cows producing 400 lb. of butterfat. Apparently, man with his ingenuity has accentuated ketosis in dairy cattle by breeding for high milk production without keeping abreast on how to maintain the normal physiology through nutrition and proper management.

In some geographical areas ketosis is seasonal. In the northeastern states,[24] and the British Isles,[7] more cases are treated from December through March and fewest during the summer months when the cows are on pasture. On the Island of Jersey,[7] little seasonal variation is reported. Feeding and management practices influence occurrence of ketosis.

Cows of all ages have ketosis; however, the incidence is reported to be greater during calvings of highest milk production. In studying 1,429 cases of ketosis, Allcroft[1] of England showed that 24% of cases occurred after the first and second calvings while 62% appeared after the third, fourth, and fifth calvings. Also, marked ketosis was most common during the third week after calving (25.9%). From the ninth to 42nd day after calving, 71.6% of the cases were observed. Obviously, ketosis manifests itself at the critical time of maximum milk production when the cow is in greatest need for nutrients and normal body functions. As a result, it is the high producing dairy cow that develops ketosis. For example, if one conducts a ketone test on the urine of all cows in a high producing herd, it is not uncommon to find 10 to 20% positive tests. These cows are not exhibiting clinical ketosis. It does mean, however, that these animals are being shortchanged nutritionally and that proper dietary corrections should be made. Diluting the urine containing ketone bodies ten times with water

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**Carnation Homestead Daisy Medcap, 2337079, owned by Carnation Milk Farms, Carnation, Wash.

is suggested to determine the severity of ketonuria. In the event a positive test is still obtained, chances are that this cow will soon exhibit symptoms. On the other hand, a high percentage of the urine samples will be negative indicating mild ketonuria.

Udall[19] states that ketosis occurs in well-nourished, high-producing cows and heifers. It is true that the cows might be in excellent condition but it is erroneous to assume that the cows are well-nourished. For example, a fleshy person carrying excess fat, as some cows do, is not necessarily healthy or well-nourished. A beef animal in the feed lot may carry considerable flesh and yet exhibit signs of vitamin A deficiency. These animals are not well nourished. They, too, are being fed inadequately.

A number of factors may predispose dairy cattle to metabolic disorders. Among these are deficiencies of energy (T.D.N.), protein, minerals, B-vitamins, and vitamin A in addition to digestive upsets involving the rumen and delayed peristaltic movements that may be present in the ketotic cow. These predisposing factors with high nutritional requirements to meet the needs for maintenance, lactation, and reproduction augment the incidence of ketosis. Bacteria and protozoa in the rumen have to be supplied with raw materials (nutrients) to synthesize B-vitamins, proteins, and other nutrients. The body proteins of these microbial organisms are later digested by the proteolytic enzymes of the abomasum and intestines and absorbed as amino acids.

According to Underbjerg,[21] the underlying cause of ketosis is in the rumen. Nutrition of microorganisms in the rumen is important in maintenance of health. An inactive rumen, where cellulose digestion is impaired, may result in a number of nutritional deficiencies which, in turn, predisposes to ketosis.

In a review article Sampson,[15] has evaluated some of the treatments for ketosis. He stressed the importance of adequate blood sugar and liver glycogen not only to prevent ketosis but also in the treatment of clinical cases.

After treating 200 to 300 cases annually for a number of years Vigue,[23, 24, 25] concluded that 90% of his cases were fed inadequate rations. By adjusting intake to meet allowances of the National Research Council (N.R.C.)[14] incidence of ketosis was reduced considerably. Vigue[24] has summarized his findings as to how a cow may be short-changed nutritionally and be predisposed to ketosis. They are as follows:

(1) A ration with too wide a nutritive ratio being fed during the dry period causes cows to get too fat and undernourished. Virtually, this is a low protein, high carbohydrate ration fed during the dry period.

(2) An inadequate ration fed immediately after calving when energy requirements are high. Udder congestion and subcutaneous edema anterior to the udder are cited as being caused by improper feeding, *i.e.*, too much energy and not enough protein. A balanced ration is recommended to reduce the congestion and not reduce the feed consumption which further depletes the animal body nutritionally. Some investigators[4, 26] believe that incidence and severity of mammary edema are not affected by the dietary level of protein or carbohydrate.

(3) An inadequate quantity of ration is fed to cows after calving. Cows must be fed for maintenance and the amount of milk they produce. Cows often reach their peak ten days after calving; therefore the feeding for maximum milk production should not be delayed as is sometimes recommended.

(4) Overfeeding of cows during the dry period may cause animals to go off feed prior to freshening. The ultimate result is the creation of nutritional deficiencies which may hasten onset of ketosis.

(5) Since 90% of the cases of ketosis have been short-changed nutritionally, it was concluded that the impairment of the pituitary gland and the adrenal cortex is the result of malnutrition and not the primary cause of ketosis.

TABLE 1. Daily Dietary Requirements of 1,200-lb. Dairy Cow Giving 30 lb. of 4% Milk During Last Third of Gestation

	Total Feed lb.	Dig. Prot. lb.	T.D.N. lb.	Ca gm.	P gm.	Carotene mg.	Vit. D I.U.
Maintenance	18.0	0.7	9.2	12.0	12.0	72	4800
Lactation	+	1.35	9.6	30.0	21.0	+	+
Reproduction	8.0	0.6	6.0	12.0	7.0	30	+
Total	26.0+	2.65	24.8	54.0	40.0	102+	4800+

The report by Marshak[12] supports the work of Vigue. In this article protein requirements are stressed not only during lactation but also during the dry period. Eckles *et al.*[3] show that normal milk contains 3.5% whereas colostrum contains 20.68% protein or approximately six times the quantity present in milk.

Thus, the protein in the ration prior to and after calving is important. One should not overlook energy, minerals, and vitamins A and D. They, too, are important.

Table 1 itemizes the dietary allowances of the National Research Council[24] for a 1200-lb. cow giving 30 lb. of 4% milk. The nutritive ratio for this cow should be 1:8. It is calculated by subtracting the digestible protein from the T.D.N. and dividing that number (digestible non-nitrogenous nutrients) by the digestible protein. When this cow becomes dry (omitting the lactation allowances), the nutritive ratio is 1:10. Vigue[24] does not state what the ratio should be during the dry period. He states that feeding according to the N.R.C. allowances will reduce the incidence of ketosis but he does not state that a nutritive ratio of 1:10 is too wide.

Tables 2, 3, and 4 present possible rations that could be fed the 1,200-lb. cow giving 30 lb. of 4% milk. In table 2, it is likely that this cow eating 30 lb. of alfalfa hay will consume only 8 lb. of grain. If 12 lb. of grain are eaten, less roughage will be consumed. A deficiency of T.D.N. is the ultimate result. As illustrated in table 4 it is unlikely that the cow will eat 16 lb. of concentrate if 24 lb. of roughage are consumed. Again a deficiency of T.D.N. might occur. When non-legume roughages are fed, protein and calcium supplements are necessary.

Dairymen are aware that there is considerable variation as to the quantity of feed that cows of the same size will eat. It is possible that the balanced rations presented in tables 2 and 4 and in table 3 after the T.D.N. and phosphorus requirements are met, will be consumed by some animals. However, a greater percentage of cows will not eat the total quantities; therefore a portion of the milk produced will be at the expense of body tissue. As a rule, 1 lb. of grain is fed for every 4 lb. of 3.5% milk produced. Mixed grains are preferred over a single grain in a ration since they are more palatable. Morrison[18] states that the usual rate of feeding roughage is 2 lb. of good hay or silage (based on 90% dry matter) per 100 lb. of body weight per day. A liberal feeding of good roughage is 2.5 lb. per 100 lb. of body weight daily. This quantity will be eaten if the roughage is of high quality. Of course, less concentrate is consumed if the larger quantity of roughage is eaten.

During the dry period (eight weeks) a cow should gain 10 to 15% in body weight. For example; a cow weighing 1,200 lb. at the end of lactation should weigh between 1,350 and 1,400 lb. at freshening. The average Holstein calf will weigh 90 to 95 lb. at birth. The calf, placenta, and fluids lost at parturition will exceed 100 lb. This means that the cow has added 50 to 100 lb. of flesh as reserve. Unless the cow is fed adequately after freshening to meet the requirements for maintenance and milk produced, this reserve will not last long.

A large Holstein cow weighing 1,400 lb. may give 80 lb. of 4% milk one month after freshening. Table 5 gives the recommended allowances for this cow. In calculating rations

TABLE 2. Daily Ration for 1,200-lb. Dairy Cow Giving 30 lb. of 4% Milk During Last Third of Gestation

Ingredients	Total Feed lb.	D.M. lb.	Dig. Prot. lb.	T.D.N. lb.	Ca gm.	P gm.	Carotene mg.
Alfalfa hay	30	27.2	3.2	15.1	200.1	32.7	342.0
Yellow corn	12	10.2	0.82	9.6	1.2	14.8	15.6
Total	42	37.4	4.02	24.7	201.3	47.5	357.6
N.R.C. Allowances			2.65	24.8	54.0	40.0	102.0

TABLE 3. Daily Ration for 1,200-lb. Dairy Cow Giving 30 lb. of 4% Milk During Last Third of Gestation

Ingredients	Total Feed lb.	D.M. lb.	Dig. Prot. lb.	T.D.N. lb.	Ca gm.	P gm.	Carotene mg.
Alfalfa hay	20	18.1	2.1	10.1	133.4	21.8	228.0
Corn silage	40	11.0	0.5	7.2	18.0	10.8	256.0
Total	60	29.1	2.6	17.3	151.4	32.6	484.0
N.R.C. Allowances			2.65	24.8	54.0	40.0	102.0

TABLE 4. Daily Ration for 1,200-lb. Dairy Cow Giving 30 lb. of 4% Milk During Last Third of Gestation

Ingredients	Total Feed lb.	D.M. lb.	Dig. Prot. lb.	T.D.N. lb.	Ca gm.	P gm.	Carotene mg.
Prairie hay (Good Quality)	24	21.8	0.50	11.9	39.1	19.7	223.2
Yellow corn	12	10.2	0.82	9.6	1.2	12.3	15.6
Soybean meal (41%)	4	3.6	1.38	3.1	4.7	10.7	0
Total	40	35.6	2.70	24.6	45.0	42.7	238.8
N.R.C. Allowances			2.65	24.8	54.0	40.0	102.0

it is difficult to meet these recommendations; therefore such cows are likely to produce part of the milk at the expense of body tissue. Table 6 presents a ration that will meet the recommended allowances of this cow with the exception of phosphorus. A few cows may eat these quantities, but it is likely that a large number will not consume the total quantity. A deficiency of T.D.N. is the usual result. Also, a phosphorus supplement is necessary to balance the ration.

TABLE 5. Daily Dietary Allowances of 1,400-lb. Dairy Cow Giving 30 lb. of 4% Milk One Month After Freshening

	Total Feed lb.	D.M. lb.	Dig. Prot. lb.	T.D.N. lb.	Ca gm.	P gm.	Carotene mg.
Maintenance	21.0	18.9	0.8	10.5	14	14	84
Lactation	+	+	3.6	25.6	80	56	+
Total	21.0+	18.9+	4.4	36.1	94	70	84+

In view of the above, a deficiency of T.D.N. in rations of dairy cows may be the underlying cause of ketosis since the nutrient requirements for maintenance and milk production are greater than the amount of nutrients that a cow may ingest and assimilate. Therefore, the animal body calls on its fat and protein stores for energy. In the absence of available energy from glycogen and blood sugar, fats are not completely metabolized and appear in the blood, urine, milk, and skeletal muscles as ketone bodies.

A mineral mixture recommended to be fed free choice to cattle is equal parts of sodium chloride and steamed bone meal. The mixture may be improved as follows:

Iodized salt (NaCl)	48 lb.
Steamed bone meal	48 lb.
Trace mineral mixture (Fe, Cu, Co, Zn, and Mn)	4 lb.
	100 lb.

The trace minerals have been found to be beneficial in cattle rations in several geographical areas and especially when poor quality roughages are fed[17, 18, 19]. Iodized salt will prevent iodine deficiency.

Treatments

Numerous treatments have been employed in ketosis. The main purpose in treating primary ketosis is to correct hypoglycemia. One of the first symptoms of ketosis in the lactating dairy cow is marked drop in milk production, the result of attempts to correct the metabolic disorder by retaining those nutrients at the expense of milk production. Therefore, it is imperative to institute treatment that will (a) raise the blood glucose level not at the expense of body proteins and fats, (b) restore the appetite, (c) correct the dietary deficiencies, and (d) restore milk production. Of course the dairyman is most concerned with the latter; however, the first three items have to be done before milk production can be restored and continued throughout lactation.

TABLE 6. Daily Ration for 1,400-lb. Dairy Cow Giving 80 lb. of 4% Milk One Month After Freshening

Ingredients	Total Feed lb.	D.M. lb.	Dig. Prot. lb.	T.D.N. lb.	Ca gm.	P gm.	Carotene mg.
Alfalfa hay	30	27.2	3.2	15.1	200.1	32.7	342
Corn silage	40	11.0	0.5	7.2	18.0	10.8	256
Yellow corn	17	14.5	1.2	13.6	1.7	20.9	22.1
Total	87	52.7	4.9	35.9	219.8	64.4	620.1
N.R.C. Allowances			4.4	36.1	94	70	84+

A number of the treatments for ketosis have been evaluated by Underbjerg *et al*[23]. The important item is to supply glucose or energy. These treatments have been further explained by Underbjerg[21], Johnson[9], and Sampson[16]. Hexose sugars as glucose, fructose, or invert sugar are still the treatment of choice in primary ketosis. Fructose fits into the anaerobic pathway of glucose metabolism and can be converted into glucose, glycogen, or pyruvic acid. The latter compound may be decarboxylated to form the acetyl radical in acetyl coenzyme A[6, 10, 11]. Coenzyme A containing pantothenic acid is concerned with protein, fat, and carbohydrate metabolism. Goetsch *et al.*[5] have shown that separate injections of glucose, fructose, and invert sugar at the rate of 0.5 gm per kg. of body weight (equivalent to 450 ml. of a 50% solution of sugar in a 1,000-lb. cow) produced an initial diuresis with urinary loss of 10.65% of the injected glucose, 8.5% of fructose, and 7.15% of the invert sugar during the six-hour period following injection. At the end of two hours the blood glucose values had returned to normal in the invert sugar treated animals while it took six hours for the glucose and fructose-treated animals to reach or approach normal blood sugar values. These results indicate that invert sugar might be superior over glucose

in the treatment of ketosis. During the six-hour period following injection 4,805, 4,599, and 3,211 ml. of urine were collected from the cattle injected with glucose, fructose, and invert sugar, respectively. The invert sugar produced less diuresis than other sugars.

Sorbitol, a sugar alcohol, is a precursor of glycogen in the body when given intravenously. It has been used with glucose in the treatment of ketosis. Little value can be seen for this alcohol in the treatment of ketosis since it produces marked diuresis due to its low renal threshold as compared with glucose.

Calcium gluconate by itself and in conjunction with phosphorus, glucose, and other nutrients certainly has a place in the treatment of ketosis. This is especially true if ketosis might be complicated with milk fever where calcium therapy is indicated.

Various nutrients as vitamin A, B-vitamins, vitamin C, and cobalt have been used as therapeutic agents. The use of these in addition to the other prescribed regimen is not to be discouraged especially if the rations have been deficient in vitamin A or cobalt and when a digestive upset has occurred in which the microflora of the rumen may not have synthesized sufficient quantities of B-vitamins. Cobalt is necessary in the synthesis of vitamin B_{12}. A deficiency of B-vitamins, especially thiamine, decreases the appetite. Vitamin C is synthesized by the ruminant; however, conditions of stress may create such a deficiency in which vitamin C therapy is of value in the production of adrenocortical hormones[7]. The feeding of molasses (2 lb./day) is still recommended to supply energy and/or trace minerals for the growth and function of rumen microorganisms.

Chloral hydrate may be of some value in treating ketosis since its principal action is depressing the central nervous system[9] which in turn may decrease metabolism giving the body a chance to recover from its metabolic disturbance. It should be remembered, however, that the chlorinated aliphatic compounds as chloral hydrate might be toxic to the liver. Since the liver is already overworked oxidizing fats to ketone bodies attempting to furnish glucose or energy to the energy-depleted body, it does not appear feasible to administer a potential liver toxin. Antihistamines have been used in treating ketosis. There is little justification for such therapy.

Sodium acetate, sodium lactate, sodium propionate, sodium bicarbonate, and ammonium lactate have been used as dietary treatments of ketosis. The sodium of the first four chemicals should be beneficial in alleviating the acidosis since acetoacetic acid and betahydroxybutyric acid are excreted in the urine as alkaline salts. The acetate radical enters the coenzyme A cycle. The lactate and propionate radicals and glycerol are antiketogenic. They enter the pathway of carbohydrate metabolism to the formation of glycogen. Energy is required in these mechanisms. Thus, some value can be expected from these compounds, but one should not rely on them alone since intravenous administration of hexose sugars and correcting the ration are superior treatments.

Numerous reports have been published for and against the use of the adrenocorticotropic hormone (ACTH) from the anterior pituitary and the carbohydrate regulating hormones from the adrenal cortex[15, 16, 20, 21, 23, 24]. These hormones do increase the blood glucose levels by gluconeogenesis. Proteins and fats from the animal body are broken down in this process. Since the veterinarian has other agents such as hexose sugars, that will increase blood glucose without expense to the animal body, these are recommended. Furthermore, the cost of ACTH or cortisone limits their use when compared with the hexose therapy and appropriate dietary measures. Hormone therapy may further depress milk production since proteins and fats are broken down to form energy and/or glucose.

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Official Poultry Inspection Programs†

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WITHIN recent years, there have been many indications of increased interest in official poultry inspection programs. Resolutions or recommendations have been adopted calling for such programs on a mandatory basis at the federal, state, or local levels, by numerous organizations, including the Conference of State and Territorial Health Officers, the U. S. Livestock Sanitary Association, the Association of State Public Health Veterinarians, the Conference of Public Health Veterinarians, the Central Atlantic States Association of Food and Drug Officials, and the Amalgamated Meat Cutters and Butcher Workmen of North America.

Recognizing this interest, and desirous of a uniform approach to prevent unnecessary trade barriers, the poultry industry, represented by the Institute of American Poultry Industries, has assisted the U. S. Public Health Service in the development of a poultry ordinance, for consideration by state and local agencies which are interested in revising existing poultry regulations or adopting new ones. The sanitation provisions[1] of this ordinance were published in April 1955, and the inspection-for-wholesomeness provisions are scheduled for completion early in 1956. Much interest has been expressed in this ordinance. Furthermore, there are indications that a bill calling for mandatory federal inspection of all processed poultry shipped interstate may be introduced into the current session of Congress.

Therefore, it seems appropriate at this time to discuss existing poultry inspection services. In line with the theme of today's program, the role of the veterinarian in providing adequate poultry inspection services should be of particular interest.

Federal Programs

Three Departments of the United States Government have a primary interest in the subject of poultry inspection. These are the Department of Health, Education, and Welfare, the Department of Defense, and the Department of Agriculture.

Department of Health, Education, and Welfare. The Food and Drug Administration, Department of Health, Education, and Welfare, enforces the Federal Food, Drug, and Cosmetic Act, the general provisions of which apply to dressed poultry and other poultry products just as to other foods.

The Act specifically prohibits interstate commerce in adulterated or misbranded foods. The law defines a food as adulterated: (1) if it bears or contains any poisonous or deleterious substance which may be injurious to health; (2) if it bears or contains any *added* poisonous or deleterious substances for which no safe tolerance has been established by regulation, or in excess of such tolerance if one has been established; (3) if it consists in whole or in part of any filthy, putrid or decomposed substance, or if it is otherwise unfit for food; (4) if it has been prepared, packed or held under insanitary conditions whereby it may have become contaminated with filth, or rendered injurious to health; (5) if it consists in whole or in part of a diseased animal or an animal having died otherwise than by slaughter; or (6) if its container is composed in whole or in part of a poisonous or deleterious substance which may render the contents injurious to health.

The most frequent violations are the ship-

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Fig. 1. Antemortem examination of poultry.

ment of diseased poultry, shipment of poultry contaminated with fecal matter, shipment of decomposed, excessively bruised or otherwise unfit poultry, and shipment of poultry processed under insanitary conditions. "Needling" with water to increase apparent weight is also revealed occasionally.

Illustrative of violations in category (1) above were the several seizures a few years ago of birds which had been treated with the chemical diethylstilbestrol to produce an effect similar to that produced by surgical caponization. The birds were marketed with residues of diethylstilbestrol pellets remaining in the neck. This chemical is a synthetic hormone and as such is a drug and an injurious substance within the meaning of the law.

Category (2) above is illustrated by the fact that a tolerance has recently been established for residues of chlortetracycline, one of the antibiotic drugs, for use in processing of dressed poultry to prolong the keeping quality, or "shelflife," of the product. Safety of the residues permitted was established by a showing that residues of this magnitude would be destroyed in the cooking of the poultry. Residues in excess of the tolerance would constitute adulteration.

The enforcement program is based upon two basic operations: (1) The inspection of the poultry processing establishment, and (2) the examination of poultry as found in wholesale and retail markets. Both of these operations are conducted on a spot-check basis; not continuous inspection or examination of all poultry shipped.

Inspection of the processing plant is intended to uncover practices which may result in shipment of adulterated poultry. If interstate shipment is established, samples are obtained. Three types of corrective action are provided for by the law: Seizure of the offending article to remove it from the market; criminal prosecution of the shipper, with penalty of fines and/or imprisonment; and court injunction against further violations, under penalty of contempt of court. All actions under the Federal Food, Drug, and Cosmetic Act are taken through federal courts. The enforcement program at federal level, however, is carried out in cooperation with the state and local enforcement agencies, so that violative products which are not subject to federal law may be dealt with under state and local laws.

In the enforcement of the law as it applies to diseased poultry, the Food and Drug Administration uses veterinarians (a) to advise regarding policy in the interpretation of these provisions of the law and in formulating its program; (2) to train its lay inspectors to recognize "suspect" poultry; and (3) to make final determination as to whether the poultry is diseased, for purposes of court action.

The Public Health Service, also a constituent agency of the Department of Health, Education, and Welfare, has no program for the actual inspection of poultry. Liaison is maintained, however, between the Service and other federal agencies on factors of public health significance related to poultry inspection and sanitation activities. For example, PHS and FDA are presently cooperating in the development of a manual, Diseased and Otherwise Adulterated Poultry, Evaluation From Regulatory Viewpoint. This manual will deal with (1) the essentials of an adequate poultry inspection program, including organization and inspection personnel, (2) the public-health and adulteration significance of various diseases

Fig. 2. USDA veterinary inspector conducting postmortem examination of carcass and viscera at a modern processing plant.

and other conditions of poultry, and (3) the proper disposition of affected poultry. It will serve as a statement of FDA policy and as a guide to FDA field inspectors; it will also be made available for the guidance of interested federal, state, and local agencies.

The Milk and Food Program, Division of Sanitary Engineering Services in Washington, and the Veterinary Section, Communicable Disease Center, in Atlanta, have joint responsibility for the poultry program activities of the Public Health Service. The Veterinary Section, CDC, has conducted studies of the bacteriology and epidemiology of poultry diseases transmissible to man and maintains epidemic intelligence on psittacosis.

Further mention of PHS activities is made below in connection with state and local programs.

Department of Defense. The food inspection services of the Department of Defense have been ably described by Kester[2] and by McNellis[3] in papers presented at annual meetings of the American Veterinary Medical Association.

Quoting McNellis:

". . . the food for the Armed Forces is procured by the Quartermaster General, and one of the important phases in this procurement, is the proper inspection of animal foods. This has for its purpose two primary objectives which are essential to the health of the troops: (1) To protect military personnel from foodborne diseases of animals, transmissible to man; and (2) to enforce compliance with the terms of the purchase instruments with respect to type, class, and grade, thus assuring that the soldier's ration will be of the quality and nutritive value prescribed, as well as protecting the financial interest of the Government.

". . . Foods of animal origin, such as meats, meat products, poultry, dairy products, and fish products, fresh, frozen, canned, or dried, used by the military are inspected by the Army and Air Force Veterinary Corps prior to purchase, during processing, while in storage and transit, and at issue. Only those foods of animal origin which originate in establishments approved by the Veterinary Corps or certain other governmental agencies are accepted. In the United States, only those plants operated under the supervision of the Meat Inspection Division of the Bureau of Animal Industry are used as sources of supply for meats.

"In the procurement of ready-to-cook poultry, the Armed Forces procure only from plants

Fig. 3. Sanitary practices and suitable equipment are essential to production of wholesome poultry.

which are operated under the Poultry Inspection Service of the U. S. Department of Agriculture; on the other hand, in most overseas theaters, no approved sanitary inspection agency is available. In those areas, the Veterinary Corps is charged with the complete inspection, including antemortem and postmortem inspections and inspection of foods of animal origin at final destination for identity and condition.

". . . . Veterinary inspections . . . are performed by graduate veterinarians and trained assistants at most of the food centers and in Army and Air Force installations in the United States and many overseas theaters. The inspectors, both officers and enlisted, are given special training in food-inspection duties at the Army Medical Service Meat and Dairy Hygiene School located in Chicago.

"The excellent health record of the Armed Forces, as shown by the absence of major disease outbreaks caused by contaminated or spoiled food products, proves that the Veterinary Corps food-inspection program, as outlined, is essential, sound, economical, and to the best interests of the government."

For a more adequate understanding of the food inspection activities conducted by the Department of Defense, and their relationship to other official programs, I recommend that both McNellis' and Kester's papers be read in their entirety.

Department of Agriculture. As mentioned by McNellis, the U. S. Department of Agriculture carries on a poultry inspection program

This program was discussed in detail by Mr. Hermon I. Miller, Director, Poultry Division, Agricultural Marketing Service, USDA, in a speech presented at the 25th annual convention of the Virginia State Poultry Federation, Richmond, Virginia, October 13, 1955. Copies of Mr. Miller's speech are available upon request to his office. Nevertheless, I will quote portions of it here:

". . . . The poultry inspection service is carried on under authority granted the U. S. Department of Agriculture in the Agricultural Marketing Act. This Act provides that the USDA may provide certain marketing services on a voluntary basis to applicants for such services. . . . I wish to emphasize that the authority of the Department in this regard is providing service on a voluntary basis. We do not have statutory authority for regulating the operations of poultry-processing plants. Instead, we consider it to be our job under this program to help those who use the service meet the requirements of regulatory agencies, such as the Federal Food and Drug Administration of the U. S. Department of Health, Education, and Welfare, or state agencies charged with the responsibility by their legislatures.

". . . the poultry inspection program is . . . financed to a major extent by payments made for the service by users of the service. . . .

"To supervise operations, to keep interpretations of regulations, and to keep operations of the program uniform in all areas, we have established four area offices. . . . The technical supervision is provided by graduates of accredited veterinary schools. They are all federal civil service employees. The personnel in the plants are under the direct supervision of veterinarians who have responsibility for final disposition of all poultry carcasses. We have a small technical staff in the federal office in Washington responsible for development of instructions and supervision of the area offices. . . .

". . . Two types of services are actually provided. First, postmortem examination of poultry during the time of evisceration to determine whether it is free from any diseased conditions which would make it unfit for human food. Our indicia, which covers products produced under the program, indicates that the product has been inspected for wholesomeness. Wholesomeness is defined to include not only freedom from diseased conditions, but also to indicate that the product was processed in a sanitary manner. Our aim is to have product covered by this indicia which is wholesome, in that it is free from any disease condition which might be detrimental to human health, as well as having been processed in a sanitary manner, and which, when finally prepared, is truly ready-to-cook. We estimate that between 20 and 25% of all poultry sold off farms is processed under the supervision of the USDA.

"The second service consists of supervising the further processing of poultry, *i. e.*, preparing frozen poultry pies, various canned poultry products,, et cetera. In this program, we concern ourselves with sanitation, with the fact that the product is processed from poultry which is truly wholesome in that it was examined during evisceration to determine its wholesomeness, and we help the company meet the standards called for in formulas established for the particular product."

Fig. 4. Condemnation of diseased carcasses by veterinary inspector of U. S. Department of Agriculture.

It is interesting to note that the USDA voluntary inspection program has grown rapidly during the last four years. In 1951, with 189 plants using the service (as of October 15), 694,530,135 lb. of poultry were inspected, with 4,075,121 lb. condemned. There was an increase to 221 plants in 1952, with 902,907-357 lb. inspected and 5,766,118 lb. condemned; 235 plants in 1953, with 1,003,841,374 lb. inspected and 6,029,859 lb. condemned; and 257 plants in 1954, with 1,139,703,950 lb. inspected and 6,960,529 lb. condemned. Mr. Miller stated that there are 265 plants now using the service, as compared to 145 early in 1951.

Federal-State Programs

In addition to the federal program described above, the USDA may enter into a cooperative federal-state inspection-for-wholesomeness program with a state agency. Essentially, such a program is carried on by the state agency, with technical supervision the responsibility of the

USDA to the point where the labels are applied to products or where certificates are issued on products. This technical supervision is exercised either by a federally employed circuit supervisor, or by a federally employed state supervisor. Products inspected under this type of program may carry the USDA indicia for wholesomeness. Such a program, voluntary in-so-far as industry is concerned, is now in operation in North Dakota, and one is being considered in Maine.

State and Local Programs

The Agricultural Marketing Service, USDA, recently published a report[4] on state and local poultry marketing regulations. This report states:

"The regulations vary widely and significantly between states, counties, and cities. They range from rather mild control of the movement of live poultry to a relatively strong control of much of the marketing process."

In general, existing state and local programs are concerned with control of sanitation factors during processing and distribution. The extent

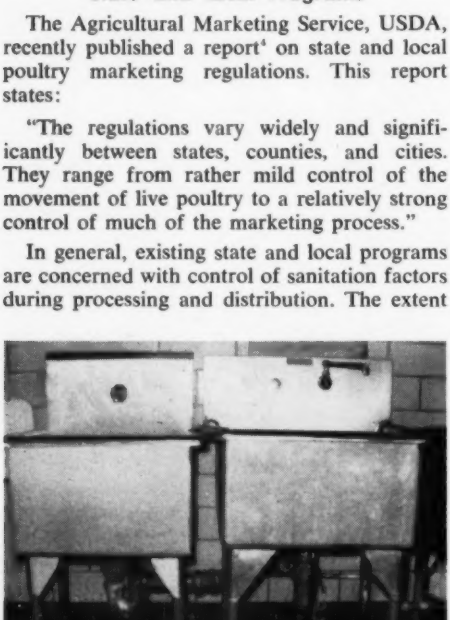

Fig. 5. Trapped sinks to which hot and cold water is piped and equipped for foot operated controls. Note impervious construction of walls (tile) and floors (concrete). Scene from a modern poultry processing establishment.

of control and enforcement would be difficult to evaluate. However, at least 27 states have food and drug laws patterned after the Federal Food, Drug, and Cosmetic Act, which provide authority for the same type of program at state level as is conducted at the federal level by the U. S. Food and Drug Administration. In addition, many local agencies exercise some control over sanitation factors within their jurisdictions.

Up to this time, the relatively few state and local inspection-for-wholesomeness programs have been voluntary in nature, involving a small part of the poultry processing industry. I do not know to what extent veterinarians are utilized in specific programs, but a number are used in one capacity or another. Requirements and procedures under these programs have not been uniform.

Nevertheless, as mentioned in the beginning of this paper, much interest has developed within the states during the last few years in the subject of poultry inspection and sanitation. For example, California has a law calling for mandatory inspection of poultry, scheduled to go into effect July 1, 1956. North Carolina has a new state law providing for a voluntary-type poultry inspection service.

Because of the traditional role of the Public Health Service in the field of public health as related to state and local programs, there have been numerous requests and recommendations that the Service advise and assist the states in the establishment and conduct of more adequate and uniform poultry programs. The possible role of the Service in this regard was described by Faulkner[5] in 1951:

"Because protection of the public health is primarily the function of state and local governments unless specific problems of an interstate nature are involved,, in conducting its program the Service acts solely in an advisory, stimulative, and research capacity. Actual enforcement is left to state and local authorities having legal jurisdiction. Therefore, our program is designed to assist state and local regulatory agencies and the food industries. Its aims are to promote the establishment of an effective and well-balanced food-sanitation program in each state; to stimulate the adoption of adequate state and local control legislation; to encourage strict and uniform enforcement; and to encourage industry support of, and day-to-day compliance with, state and local milk and food sanitation programs.

"To implement these aims, the Public Health Service engages in a number of coordinated and related activities which can be broadly grouped into six major categories, as follows: (1) Development of program guides; (2) research and investigation; (3) assistance to state and local programs; (4) education and training; (5) development of food-equipment standards; and (6) interstate program activities."

As previously noted, the Service is developing a poultry ordinance, and is working jointly with the Food and Drug Administration on

manual, Diseased and Otherwise Adulterated Poultry, Evaluation From a Regulatory Viewpoint. In addition, some visual training aids are being developed, dealing with poultry inspection and sanitation. It is hoped that these program guides will be useful to agencies planning or conducting poultry inspection programs. A more complete discussion[6] of the Public Health Service program will be published soon in the *American Journal of Public Health*.

Role of the Veterinarian

It is apparent that the veterinarian may play either a supporting or directly participating role in the provision of adequate poultry inspection services.

Certainly, much important work in poultry hygiene must be done by research veterinarians, poultry pathologists, animal disease control officials, and practicing veterinarians. The number of diseased birds being sent to plants for processing must be reduced if the health of plant employees is to be protected, and the best interests of the consuming public served.

Prevention and control of poultry diseases on the farm is far more satisfactory than a mere condemnation of unfit poultry in the processing plant. The ideal, of course, would be disease-free flocks. Lacking this, the practice of marketing flocks when disease outbreaks occur should be discouraged by the veterinary practitioner. Close liaison should be maintained between the practitioner and animal disease control officials. In turn, there should be a reciprocating flow of information between the veterinary poultry inspector, the public health veterinarian, and animal disease control officials, as an aid to more effective poultry inspection, as well as for more effective protection of human health and for better poultry disease control programs.

The veterinarian may participate in actual poultry inspection programs either in an administrative or supervisory capacity, as a food and drug field inspector, in support of non-veterinary field food inspectors, as a laboratory or training specialist, or in a supervisory role[7] or as a poultry inspector in the processing plant. There are frequent opportunities for practicing veterinarians to work part-time or seasonally in poultry inspection work.

Because of his professional training, the veterinarian can become pre-eminently qualified in the field of food inspection, particularly in regard to foods of animal origin. However, I would offer a note of warning. A veterinary degree alone is not necessary proof of such qualification. Specialized training and supervised experience are needed. To be adequate, a poultry inspection service must deal not only with diseased poultry, but with a multitude of sanitation, adulteration, and disease factors throughout the processing, storage, distribution, and sale of poultry and poultry products. The veterinarian should recognize these factors, become informed concerning them, and be sincerely willing to carry out all of the responsibilities associated with any position he may fill in any official poultry inspection program.

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Penicillin in Food

Food and Drug administration officials have found traces of penicillin in 3 to 11½% of milk samples tested at random across the United States, according to report in *Time* for Mar. 5, 1956.

Milk added to the supply from cows too soon after treatment is responsible. The minute amounts are not dangerous to the vast majority of consumers, but may be sufficient to cause sensitivity in some individuals. A few who are extremely sensitive may suffer serious reaction to amounts of penicillin as small as they are known to be in a significant quantity of the fluid milk supply.

▼ ▼ ▼

Pennsylvania has 34 counties now brucellosis-free and plans are developing rapidly toward state-wide eradication. Pennsylvania State Veterinarian, Dr. H. A. Milo reports that 86% of all dairy and beef cattle in the state are under some form of brucellosis control.

Kentucky Veterinary Laboratories Cooperative, Inc.

In 1953, Crown Crest Farm purchased the most modern laboratory equipment available and obtained the services of Mr. Dale Henthorne, an experienced technician to run urinalysis, red cell determination, blood chemistry and make bacteriological examinations. This laboratory did most of its work on horses and compiled one of the largest number of normal blood chemistry values for Thoroughbreds on record.

Mr. and Mrs. Howard Reineman in reducing the scope of their activities have sold at cost the entire equipment and records of the laboratories to the Kentucky Veterinary Laboratories Cooperative, Inc.

This corporation is made up of the veterinarians in central Kentucky and Mr. Henthorne. Any profits which may acrue from operations of this organization will be used to subsidize research in clinical applications of blood chemistry and to repay monies advanced to purchase the laboratory.

Veterinarians pledged to buy stock in the organization are: Drs. Alexander, Ausherman, Bardwell, Davidson, Davis, Eastin, Hagyard, Jeffers, Lee, Magee, Proctor, Pessin, Steiner, Sutton, and White together with Mereworth Farm of Lexington, Kentucky and also Drs. Finley of Richmond, Sherrill of Frankfort, Worthington of Nicholasville, Bushnell and Caslick of Paris and Folsom of Danville, Kentucky.

The laboratory will be moved to a central location in Lexington and the present policy of accepting blood, urine, and bacteriological samples from any farm or stable through the attending veterinarian will remain in force. Samples are invited from any phase of the horse and cattle industries or small animal owners. The move will provide excellent laboratory diagnostic service for veterinarians in Kentucky and adjoining areas.

▼ ▼ ▼

The British Veterinary Association is asking members with experience in treating less usual pets (birds, rabbits, goldfish, hamsters, monkeys, et cetera) to register as being prepared to give advice to others in the profession on specific problems related to such patients. The Association announces that there is an increasing demand for veterinary service in such treatment.

Bovine Ketosis Complex

(Continued from page 211)

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Small Animal

SECTION

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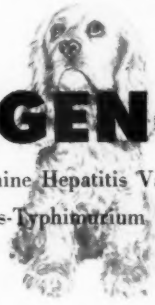

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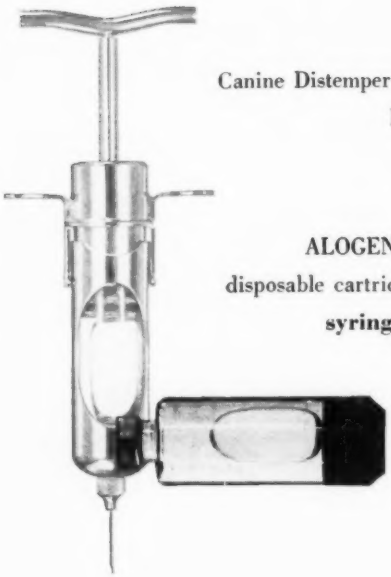

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General Anesthesia vs. Local Anesthesia In Small Animal Practice†

K. W. SMITH, D.V.M., Sioux City, Iowa

ANESTHESIA is the foundation upon which modern veterinary surgery is built. It is even more than a means of performing painless surgery; it is a method of restraint useful in controlling highly nervous animals and those that resist handling. Selection of an appropriate anesthetic may be the most important step in an operation. If anesthesia is incomplete, a delicate operation may be difficult or impossible to perform, or on the other hand, if the patient dies from the anesthetic it makes little difference how skilfully surgery was done.

Before the veterinary surgeon is able to select properly the anesthetic to be used in any particular case, he must have a thorough knowledge of all the various anesthetic agents, their uses and limitations, and be proficient in the methods of administration. There is no procedure in veterinary medicine where experience is as valuable an asset as in the use of anesthetics. The practice of using the same type of anesthetic for all cases is definitely out of the picture because there is no one type of anesthesia that is best suited for all cases and conditions. At present, there is no anesthetic that is devoid of all danger. However, most of the losses from anesthesia should not be blamed on the anesthetic agent, but upon improper selection or administration, or indiscreet selection of patient.

†Presented at the 38th Annual Convention of the Southern Veterinary Medical Association and Florida State Veterinary Medical Association, Jacksonville Florida, Oct. 16-19, 1955.

Anesthetic agents are classified into two principal groups: (1) General anesthetics, and (2) local anesthetics. Each group includes a long list of agents of which only a few of the more important ones will be discussed here.

General Anesthetics

There are numerous indications for general anesthesia in every day small animal practice. In addition to its extensive uses in surgery, anesthesia is particularly valuable as a means of restraining dogs and cats for such procedures as radiography, endoscopic examinations, abdominal palpation, examination and treatment of the ears, teeth, pharynx, nasal passages, urogenital tract, and many others.

Morphine and Demerol. Morphine and demerol®[1] are not classed as anesthetics, but as sedatives or hypnotics. They are used as a means of restraint, and are useful for minor surgery. They also may be used as preanesthetic agents in combination with other anesthetics. The average dose of morphine is ⅛ to ¼ gr. per 10 lb. of body weight given subcutaneously. The maximum effect is reached in about 45 minutes. Atropine 1/100 gr. is often given at the same time to control salivation that accompanies morphine sedation. Morphine is contraindicated in cats. Demerol is useful in both dogs and cats. 1 cc. per 5 to 10 lb. body weight.

Ether. Ether continues to be one of the best and safest general anesthetics available

®[1]Winthrop Laboratories, New York, N. Y.

when administered by a skilled anesthetist. However, its use has declined greatly in recent years in favor of the barbiturates. A lack of trained assistants probably accounts to a large degree for decline in its use. The principal advantage of ether over the barbiturates is that the depth of anesthesia can be held under better control and recovery period is shorter. Since ether is eliminated largely through the lungs, diseases of the liver and kidneys do not preclude its use as they do with barbiturates.

Barbiturates. Barbiturates are classified according to duration of action into three groups: (1) Long acting, (2) short acting, and (3) ultra-short acting. The long acting drugs are used as sedatives, but not as anesthetics. An example of this group is phenobarbital which induces sedation that lasts for 12 to 24 hours or longer.

The intermediate group includes pentobarbital (nembutal)®[2] which will induce anesthesia that lasts for an hour or more. It is probably the most widely used barbiturate in small animal practice because the duration of anesthesia is ideal for performing most surgical operations. However, it must be used with caution, particularly in older animals. If there is renal insufficiency or liver disease, the rate of elimination is retarded so that anesthesia may persist several times as long as normal. Sometimes these animals do not recover completely for several days. When used for general anesthesia, barbiturates should be given by the intravenous route because this is the only way the depth of anesthesia can be controlled accurately. The most important precaution is to give the drug *very slowly*. I dare say that nine of ten fatalities from barbiturate anesthesia are the result of too rapid administration. Although the anesthetic dose of nembutal is approximately 1/5 gr. per lb. of body weight, variation in dosage required by different individuals is so great that the recommended dose may be fatal for one animal, and induce incomplete anesthesia in another. Therefore, it is essential when administrating barbiturates intravenously that they be given to effect instead of using a routine, measured dose. I would suggest weighing the animal to be anesthetized and measuring out approximately the proper dose. Then, during administration, watch for the desired effect instead of depending on a fixed dose. Anemic animals require reduced dosage and caution is necessary in animals that are toxic, or when there is evidence of cardiac or respiratory disease. Avoid the use of barbiturates in the presence of renal disease. Delirium and excitement are complications encountered during the period of recovery. These are usually the result of anoxia and can be relieved most readily by administering oxygen. This occurs most frequently at high altitudes, or from dyspnea such as observed in brachycephalic breeds of dogs.

Over-dosing with barbiturates usually leads first to respiratory failure and acute anoxemia, which is then followed by cardiac arrest. When death occurs during the induction stage, it is caused by too rapid administration and resulting primary cardiac arrest. In treating cases of overdosing, artificial respiration is often the only treatment necessary. However, the increased burden placed upon the heart from anoxemia justifies the use of cardiac stimulants such as metrazol®[3]. In cases of cardiac arrest, prompt intracardial injection of metrazol or epinephrine accompanied by massage over the heart and artificial respiration may bring results.

The ultra short acting barbiturates such as pentothal and surital®[4] produce anesthesia that lasts for only about ten or 15 minutes followed by a recovery period of about one hour. This is the group of anesthetics that is particularly useful in every day practice. It is the safest type of barbiturate when properly used and has a great many indications both for surgery and as a means of restraint. I particularly like surital because it has a wide anesthetic margin; it seldom causes excitement or delirium, and is relatively safe in dogs and cats of all ages when properly used. The dose is approximately one-half that of nembutal. Its duration is sufficient for performing minor surgery, and, if used for longer operations, the needle is left in the vein and additional anesthetic given as necessary. The short acting agents are useful especially in older dogs, and those that are considered poor surgical risks. The brief recovery period eliminates much of the trouble that follows the use of longer acting barbiturates.

Local Anesthetics

Local anesthesia is the blocking of the sensory nerve supply to localized areas. It is used less frequently than general anesthesia, but has a definite place in small animal surgery. The principal advantage of local anesthesia is its safety in certain types of cases.

®[2]Abbott Laboratories, North Chicago, Ill.

®[3]Bilhuber-Knoll Corp., Orange, N. J.

®[4]Parke, Davis & Co., Detroit, Mich.

particularly in old dogs or those that are suffering from cardiac, respiratory, or renal disease. Also for certain purposes it is simpler and easier to employ.

Local anesthesia is induced by several different methods. When applied to the surface of mucous membranes it is known as surface or topical anesthesia. When injected into the tissues to block the nerve endings in the area, it is known as infiltration anesthesia or field block. When injected into sensory nerve trunks to anesthetize the area supplied by that nerve, it is known as nerve block. When injected into the epidural space to block the sensory nerve roots along the spinal cord, it is known as epidural block. When injected into the spinal fluid so that the spinal cord is blocked, it is known as spinal block. All of these except spinal block are useful in small animal practice.

The principal disadvantage to local anesthesia is the problem of restraint during injection, also during the operation, even though pain is absent. Although the local anesthetics in common use are relatively nontoxic, they are not entirely free from danger. Reaction may occur in animals that are hypersensitive to the drug, or in cases where it is used in excessive quantity. Epidural anesthesia is particularly dangerous if administered improperly. The difficulty is usually the result of too rapid administration which causes sudden change in the pressure of the cerebro-spinal fluid and also may force the anesthetic too far forward in the epidural space. Severe reactions and, in rare cases, even death may result from the use of local anesthetics. There are many different local anesthetic agents available, but the ones most widely used are either procaine or cyclaine®*. Both are effective and relatively nontoxic. Cyclaine has the advantage of inducing anesthesia of longer duration and is effective in lower concentration which makes it less toxic. Cyclaine is used in ¼ to 1% solution while procaine is used in 1 to 2½% strength. For more prolonged effect epinephrine (1:40,000) may be included with the anesthetic solution.

When it comes to choosing between a local and a general anesthetic, the decision rests upon a careful consideration of all the factors involved in the particular case at hand. A general anesthetic ordinarily would be chosen unless there was some contraindication for its use. For instance, in choosing the type of anesthesia to use for Cesarian section, barbiturates are not used because of the difficulty in reviving puppies. Ether would be satisfactory except for the fact that Cesarian section is often done at irregular hours when it is necessary to get along with a minimum number of assistants. Epidural in conjunction with morphine gives satisfactory anesthesia for Cesarian section, and can be done with one less assistant than when ether is used.

Epidural anesthesia is useful for any operation on the hind legs or abdomen. A sedative such as morphine or demerol always should be given 20 or 30 minutes before making the epidural injection. The sedative not only makes it much easier to give the epidural injection, but also relieves apprehension associated with loss of use and sensation of the hind parts. The usual dose of the anesthetic is 1 cc. per 5 lb. of body weight given at the lumbosacral junction. When epinephrine is included with the anesthetic, anesthesia persists for about one hour. It should be remembered that epidural anesthesia is accompanied by a drop in blood pressure which makes it dangerous in animals that are suffering from shock or severe toxemia.

For removing small skin tumors and cysts, local infiltration anesthesia may suffice, but if the animal is nervous and difficult to restrain, a sedative should be used concurrent with the selected agent. Otherwise it may be simpler and easier to administer a short acting barbiturate providing there is no contraindication to its use. When local anesthetics are infiltrated into the field of surgery, the question arises as to how much interference with healing there may be. Although the effect upon wound healing may not be great, it is true that the process of tissue repair is retarded by the local anesthetic.

Dental surgery can be done with the use of dental nerve blocks, but for most cases short-acting barbiturates are easier to use and also solve the problem of restraint. Often only a partial anesthetizing dose of surital is required to control dogs and cats for cleaning the teeth and extracting loose teeth; also for restraining unruly animals or performing minor surgical operation on poor risk patients. A small dose of surital may serve the purpose and with less danger to the life of the patient.

Even with the greatest of care, deaths may result from anesthesia. Clients that ask for absolute assurance that there will be no danger from anesthesia are told the truth — that losses rarely occur, but that no anesthetic is entirely without danger.

®*Sharp & Dohme, Phil., Pa.

Use of Newer Corticosteroids in Animals†

J. LAVERE DAVIDSON,* D.V.M., Kalamazoo, Michigan

HYDROCORTISONE, like cortisone, is a steroid hormone that can be extracted from the adrenal gland. In all, about 30 steroids have been isolated from this gland, but only two — hydrocortisone and cortisone — have been found to be effective in rheumatoid arthritis, bovine ketosis, and in the so-called connective tissue and allergic diseases. More and more attention is being focused on hydrocortisone because it is approximately twice as powerful as cortisone and is the principal secretion of the adrenal glands. Under normal conditions, hydrocortisone appears to play an important role in maintaining life and the ability of an animal to withstand a variety of stresses, such as infection, shock, or intense cold or heat.

Hydrocortisone and Cortisone

The question is frequently asked: Do hydrocortisone and cortisone cure any diseases? Of themselves, neither of these hormones cures any disease any more than insulin "cures" diabetes or digitalis "cures" heart disease. These agents correct the clinical and biochemical abnormalities of disease, restoring the animal toward normal, so long as the hormones are being administered. If hydrocortisone is given during an illness of short duration and of a self-limited nature, such as an acute, severe, allergic reaction, the symptoms of the reaction are quickly and conveniently controlled. The hormone can then be withdrawn without fear of recurrence of the sensitivity reaction so long as the animal does not again come in contact with substance responsible for the allergy. When used to treat a chronic disease, such as rheumatoid arthritis or certain skin diseases, the hormone suppresses symptoms much as a blanket smothers a fire. When the blanket is removed, the fire may flare up. Likewise, when hydrocortisone is discontinued, the chronic disease process tends to flare up sooner or later.

If we knew how hydrocortisone and its less potent brother, cortisone, acted in relieving the symptoms of these conditions, we might better understand the fundamental, biologic actions of these hormones. Our knowledge of many of the diseases upon which the two drugs have so profound an influence is also fragmentary. The discovery and development of these agents has made possible the performance of certain operations for the management of advanced cancer, hypertension, and serious forms of diabetes in human beings, which the surgeon would not have dared to undertake a few years ago. They have made prolonged and comfortable life possible in animals suffering from heretofore fatal conditions. Equally important, however, they have restored to normalcy the well-being of untold numbers of animals suffering from diseases which do not take life but just ruin it.

Hydrocortisone differs from cortisone in several ways. When these hormones are administered to animal patients by mouth or by intramuscular injection, the nature of the effects produced upon the tissues of the body is the same but the intensity of their action differs. Hydrocortisone, when administered by mouth, is one and one-half to two times more potent than cortisone. Thus, less hydrocortisone is necessary to produce the same degree of therapeutic activity as cortisone. This is true whether the condition is a metabolic disease, such as bovine ketosis, or rheumatoid arthritis in dogs. It is believed by some medical investigators that cortisone is effective in the body only after it is transformed into hydrocortisone by the liver. We know, too, that hydrocortisone is the principal steroid hormone produced by the adrenal gland. Ointments of cortisone are relatively ineffective when applied locally to diseased skin, while topically applied suspensions and ointments of hydrocortisone are extremely effective in the management of a wide variety of inflammatory and allergic conditions of the skin, nose, ear, and eye. Then, too, cortisone is by no means as effective as hydrocortisone when injected into an inflamed joint, such as the knee.

Hydrocortisone ointments have been found particularly effective in controlling certain in-

†Presented at the 38th Annual Convention of the Southern Veterinary Medical Association and Florida State Veterinary Medical Association, Jacksonville, Florida, Oct. 16-19, 1955.

*Medical Division, Veterinary Medical Department, The Upjohn Company.

fectious conditions of the skin, eye, and external ear. The steroid is often combined with neomycin so that there is both anti-inflammatory and broad-spectrum antibacterial effect. Indications for use of such a preparation would be: Summer eczema, suppurative dermatitis, allergic dermatitis, infections of the anterior ocular segment and eyelids, and suppurative otitis externa. Keloidal scars have long been a difficult problem in equine practice, especially in racing or show animals. Here, too, there is evidence that hydrocortisone-neomycin ointment, topically applied, offers prophylaxis against this hypertrophic-scar condition.

The intra-articular injection of hydrocortisone acetate in aqueous suspension is recommended for the localized treatment of rheumatoid or traumatic arthritis (carpitis, tarsitis, gonitis, coxitis, navicular disease), osteoarthritis (early ringbone, sidebone, bone spavin), periostitis (splints, bucked shins), bursitis (navicular disease, hygroma), synovitis (bog spavin, hygroma, thoroughpin), tenosynovitis, and tendinitis. This compound recently has been combined with neomycin and preliminary evidence indicates this suspension to be of value in the palliative treatment of arthritis associated with pyosepticemia (joint-ill) of foals, in conjunction with systemic therapy.

There are a number of conditions which would make the internal use of steroid hormones somewhat hazardous in view of certain complications which might ensue. For instance, a human being having an active peptic ulcer should not be treated with these hormones because of the possibility that perforation or hemorrhage from the ulcer may result. The presence of active or arrested tuberculosis is a cardinal contraindication to such hormone therapy because of the danger of rapid spread of this disease when these agents are given internally. They should not be administered to animals with advanced disease of the heart or kidneys or with severe forms of diabetes. While at one time it was feared that they would interfere with wound healing, experience has demonstrated that the vast majority of fractures, lacerations, and operative incisions heal satisfactorily in the presence of steroid hormone treatment. Generally, cortisone or hydrocortisone is not given to human beings who are mentally ill, or who have had a history of severe emotional disturbances. However, we have learned that hydrocortisone is much less apt to cause mental stimulation or depression than cortisone.

Delta-Hydrocortisone and Delta-Cortisone

In the foregoing, hydrocortisone and cortisone have been mentioned. In addition, there are their newer derivatives: Delta-hydrocortisone (prednisolone), or as we call it, delta-cortef®; and delta-cortisone (prednisone), or deltasone®. Delta-cortef is effective in only one-third the dose of hydrocortisone. Deltasone is effective in only one-fifth the dose of cortisone.

These two new derivatives are produced by dehydrogenating at positions 1 and 2 and, therefore, differ in structure from the parent steroids by the presence of an additional double bond in ring A of the chemical structure. Both are useful in small animal medicine in exactly the same manner and for the same indications as the parent steroids, *but at reduced dosage*. In human beings there are fewer side effects at effective doses. Fortunately, side effects from steroid therapy in animals are rare and can be controlled by withdrawing the drug or reducing the dosage.

Indications

Current indications for delta-hydrocortisone are those known to be responsive to hydrocortisone therapy. These include: (1) Skin diseases — acute urticaria, allergic dermatitis, nonspecific eczema, drug and serum reactions, and burns; (2) optic and ocular diseases — iritis, iridocyclitis, secondary glaucoma, uveitis, chorioretinitis, and otitis externa (with local therapy); (3) rheumatic diseases — rheumatic arthritis, bursitis, osteoarthritis; and (4) allergic manifestations — bronchial asthma, allergic skin reactions, and pollen sensitivities.

Dosages

Delta-hydrocortisone dosage for dogs:
5-15 lb. — 1.25 mg. daily
15-40 lb. — 1.25 to 5 mg. daily, and
40-80 lb. — 2.5 mg. to 12.5 daily.

Toy dogs and puppies weighing less than 5 lb. should be dosed at a lower proportional schedule. Animals should be observed closely during therapy. When treatment is to be withdrawn, the daily dose should be reduced gradually. Dosage should be regulated according to the extent and severity of the disease under treatment.

Delta-cortisone dosage for dogs:
Suppressive dose: 10 mg. to 20 mg. daily, usually for not more than three days.

®The Upjohn Co., Kalamazoo, Mich.

Maintenance dose: 2.5 mg. to 5 mg. daily as required.

The total daily dose should be taken in divided doses, three to four times a day. Toy dogs and puppies weighing less than 10 lb. should be dosed at a lower proportional schedule.

Hydrocortisone Sodium Succinate

During the past year, a special form of hydrocortisone for intravenous and intramuscular administration was developed in the Upjohn laboratories. This solution has been lifesaving in selected cases of surgical shock in animals where the established procedures of treatment had failed to restore the blood pressure to normal. It has been used, too, in human beings critically ill with such conditions as peritonitis and meningitis to assure the patient's survival through the added stress of emergency surgery, or until the antibiotic drugs could get the infection under control. It has been employed successfully to control high fevers which sometimes occur following surgical procedures on the brain. This new steroid derivative for intravenous administration is hydrocortisone sodium succinate, better known as solu-cortef®. The high water-solubility of this compound, approximately 500 mg. per cc. (about 1600 times the solubility of free hydrocortisone), permits the immediate intravenous administration of relatively high doses in a small volume of diluent in situations in which high blood levels of the hormone are required rapidly.

Solu-cortef® may be given intravenously or intramuscularly for the physiological support in prevention or treatment of adrenal failure and shock-like states, as in: Poor surgical risks, shock from traumatic causes, severe injury, overwhelming systemic infection, acute allergic reactions, acute asthma, and emergency surgery. It combats shock by restoring response to vasopressors. It is an ideal emergency-bag drug. The dosage for small animals is 20 to 100 mg.; for large animals, 100 to 600 mg.

Oral Fluid Hydrocortisone Preparation

One other new steroid dosage form is fluid cortef®, or an oral suspension of hydrocortisone cyclopentylpropionate. Clinical experience shows oral suspension cortef to be as active as hydrocortisone tablets, well-tolerated, and palatable. A recent report indicates, in addition to the usual hydrocortisone-cortisone uses, a new and most useful application in rattlesnake bite in the dog.

Case Report

Dr. D. L. Cady of the Animal Hospital and Clinic, El Paso, Texas, has reported on the use of fluid cortef cyclopentylpropionate (hydrocortisone) as adjunctive therapy in the treatment of rattlesnake bite in the dog. According to Doctor Cady, the majority of such cases that respond to antivenin therapy develop abscesses and considerable tissue necrosis at the fang puncture sites. The patient was a cross-bred Dachshund, five years of age. Fang marks on the face indicated a fair sized rattler had attacked the small dog. Muzzle and head were swollen. The animal was given 10 cc. (20 mg.) orally of fluid cortef every eight hours for a total dose of 3 oz. in conjunction with antivenin serum. With this regimen, the dog recovered with the fang wound healing without tendency to abscess formation or evidence of tissue necrosis. This was the first and only case reported as of the date in which any form of cortical steroids had been employed.

"We have had two more cases of snakebite," states Doctor Cady, "each responding without sloughing to cortef cyclopentylpropionate adjunctive therapy. In addition, neither of these two cases received antivenin serum, nothing but antihistamine, penicillin, and cortisone suspension. Hydrocortisone orally is routine with us as adjunctive therapy in snakebite. Might even be the therapy for snakebite."

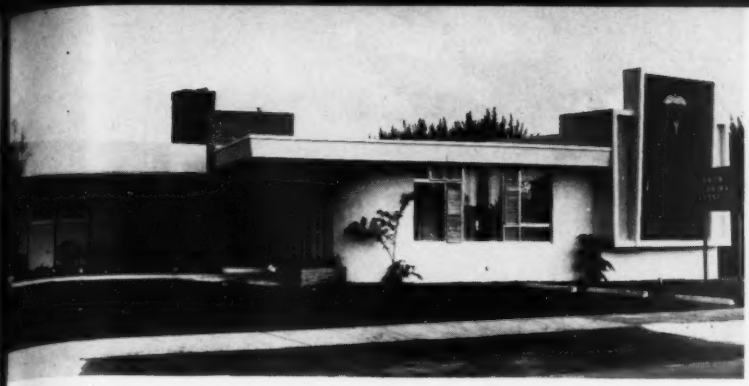
The results obtained by Doctor Cady in the treatment of three rattlesnake bite cases in the dog furnish preliminary evidence that hydrocortisone is good adjunctive therapy and apparently lessens the probability of abscess formation and tissue necrosis.

Fluid cortef contains in each 5 cc. (one teaspoonful) 10 mg. of hydrocortisone. The tentative initial daily dose for dogs and cats is:

Dogs (5 to 15 lb.) 5 mg. daily;
Dogs (15 to 40 lb.) 5 mg. to 15 mg. daily;
Dogs (40 to 80 lb.) 10 mg. to 40 mg. daily;
Cats, mature 2.5 mg. to 5 mg.daily.

These doses should be administered, if possible, in four divided, daily doses. Treatment should be continued at these starting levels for two weeks or until the desired clinical effect is obtained, whichever occurs first. The initial daily dosage is then gradually reduced at intervals of several days, in a downward stepwise fashion, to reach the smallest maintenance dose. Complete withdrawal of cortef therapy should be accomplished slowly in a downward, stepwise manner.

(Continued on page 234)



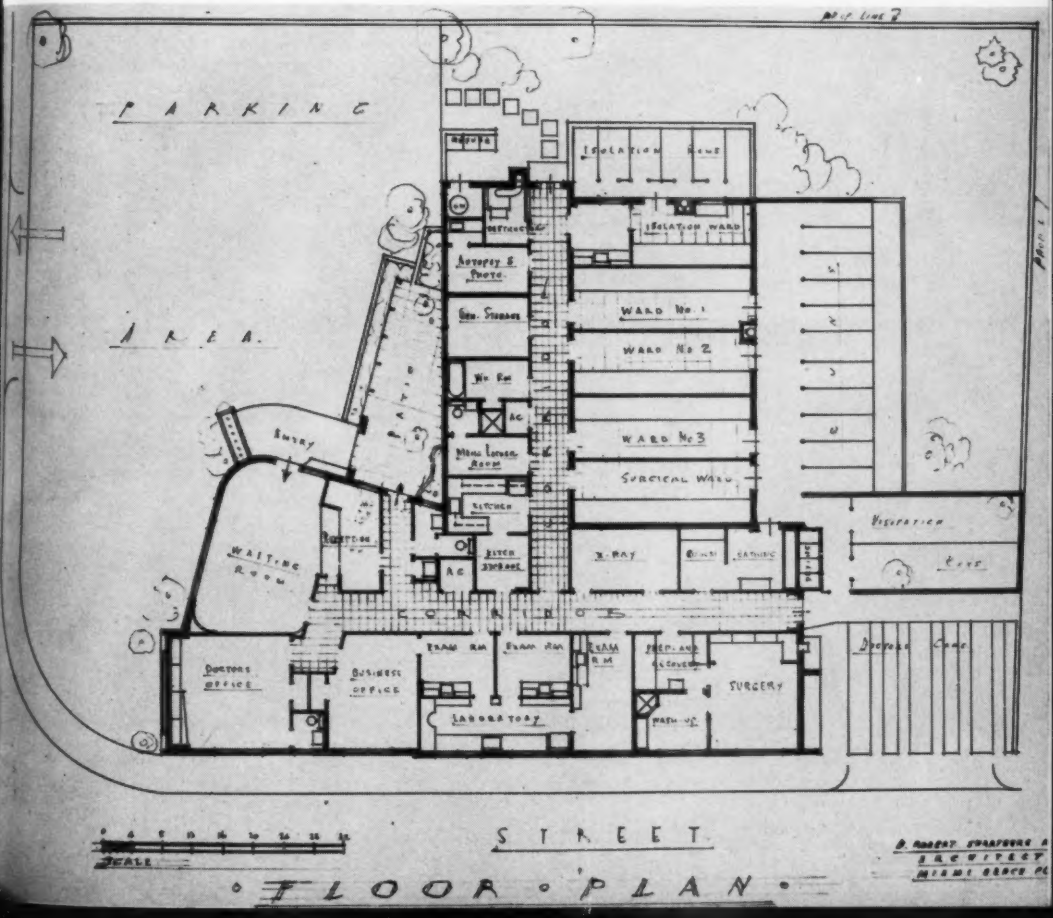
The Knowles Animal Hospital

A product of extensive analysis and time and motion studies, the Knowles Animal Hospital is an example of one of the finest facilities for medical care of pet animals in the nation. Recently completed, the beautifully designed hospital, views and floor plans of which are depicted on this and the following page, has a capacity of approximately 120 animals and is provided with the most modern equipment available.

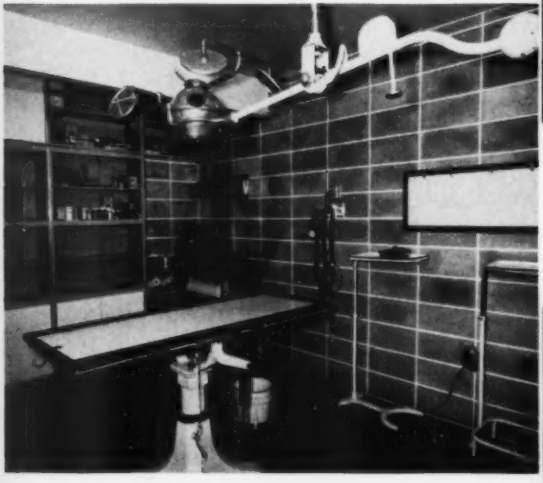
Exterior

The pleasing exterior design and treatment illustrated above is given added character by the metal caduceus mounted on that portion of the building finished with redwood boards. Letters of the sign designating the hospital are plastic mounted on redwood slats which carry out the distinctive motiff modestly.

The porch (patio) acts as exit area and also



View of general ward typical of each of the four provided. Cages are aluminum mounted fiberglas; doors hinge either right or left. Ceilings of acoustical tile; floor terazzo. Each ward lighted with skylight — and ventilated individually.



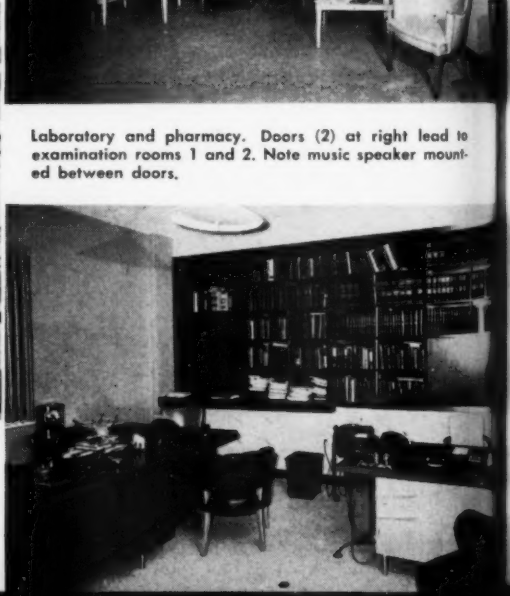
Well appointed reception room. Note music speaker on wall and recessed light fixtures.

View of Doctor's office illustrating library shelving built into west wall.

Examination Room 1. Special equipment includes built-in cabinet for supplies, piped oxygen supply and suction apparatus. Note door (rt.) to laboratory and pharmacy.

Surgery illustrating sterilization area, instrument case, X-ray viewer, and explosion-proof light fixtures. Oxygen equipment is mounted on wall at right. Floors are carbonized terazzo. Scrub room with tile shower and observation window and adjacent recovery room not shown. Walls of entire surgical suite tiled from floor to ceiling.

Laboratory and pharmacy. Doors (2) at right lead to examination rooms 1 and 2. Note music speaker mounted between doors.



to accommodate any overflow of clients from the reception room who may be waiting for laboratory work or treatment of pets.

Surfacing material for the ample parking area (see floor plan) is asphalt.

Floor Plan

Convenience of doctors and clients and efficiency in performing duties assigned the hospital staff were considered in associating hospital elements.

Adjacent to entrance into client reception area is the reception desk, exit through separate short passage to patio and parking area. Doctor's offices are located for privacy and easy accessibility to reception area, examination rooms, and laboratory. Three examination rooms have been provided each opening into the main corridor and to the central pharmacy and laboratory. A surgical suite is complete with scrub-up room, preparation and recovery room, and surgery. Facilities for grooming service have been given careful consideration. An outside entrance at this point is designed to reduce traffic through hospital corridors and wards. Note location of diet kitchen and storage area.

An isolation ward with an isolated group of outdoor runs is sufficiently removed to minimize the possible spread of infection. An exit is also provided for this area. In this wing, are special rooms for autopsy, photography, and destructor apparatus. Two generous size runs are provided for those who wish to visit their pets which eliminates necessity of clients visiting in wards at times inconvenient for the working staff.

Construction Features

Terrazzo floors throughout are considered best suited to the Florida region, are impervious to moisture, and do not absorb odors. The terrazzo employed is "carbonized" to eliminate static electricity. Walls of marblelized tile blocks extend from floor to ceiling in the surgical suite and to wainscoting height in other portions. Acoustical ceilings have been provided in most rooms including wards to reduce noise. Wards are lighted by double plexiglas sky lights. Separate ventilation is provided each ward.

Other features include special wiring for music speakers located at selected points, special drying cages, aluminum mounted fiber glass cages, built-in instrument cabinets, piped oxygen supply, and other innovations designed for practical use.

Mycetism (Mushroom Poisoning) in a Dog: Case Report

JOHN G. MARTIN, D.V.M., Boone, North Carolina

Mycetism (mushroom poisoning) has been previously reported in veterinary literature, particularly in cattle[1,2,3]. The following report describes a case of canine mycetism successfully treated with intravenous adrenocortical hormone (solu-cortef®, Upjohn).

Case Report

History. The patient, a four-year-old male Collie, weighing 60 lb., was presented with the history of having the well-known characteristic of eating "anything and everything". An unknown quality of mushroom, possibly only one or a portion of one of the Amanita species*, has been eaten. After an indefinite lag phase, the animal began to exhibit a chain of violent symptoms including: Bewilderment, vertigo, staggering, sprawling, salivation, compact but profuse bowel evacuation, severe abdominal pain (crying, crouching), "swimming" and "scrambling" convulsions at intervals of one-half to one minute. Convulsions gradually became more widely spaced, then ceased altogether as the dog became comatose.

Symptoms and Treatment. The animal was hospitalized in an unconscious state. Initial treatment with intravenous infusions of whole blood, injections of atropine, respiratory-circulatory stimulants and pressor agents, saline-dextrose and calcium gluconate infusions were ineffective. The dog remained unconscious and the condition worsened. Breathing became dyspneic, irregular, cyanosis developed, and then breathing ceased. The owner assisted in administering artificial respiration for approximately 45 minutes.

At this point, 133 mg. (one vial) of solucortef was injected intravenously. Within five minutes respiration became voluntary, and during the next two hours normal respiratory rate and excursion became established. Cyanosis disappeared and consciousness returned six hours later. The duration of coma was 15 hours. The animal was apparently normal afterward, although undigested mushroom particles were passed in the feces the following day.

®Trademark for The Upjohn Company brand of the hemisuccinate sodium ester of hydrocortisone for intravenous and intramuscular administration.

*Identified by the Biology Department, Appalachian State Teacher's College, Boone, N. C.

Discussion

In dogs, mushroom poisoning can be caused by several varieties of the Amanita genus, including *Amanita phalloides* and *Amanita muscaria*. Fully 90% of human deaths due to mushroom poisoning are caused by an Amanita species.

The Amanita toxin contained in *A. phalloides* ("toadstool," deadly amanita, death angel) has not been identified chemically, but is widespread throughout the genus. Onset of poison action is slow giving rise to symptoms only six to 15 hours after ingestion. Symptoms include delirium, convulsions, cyanosis, prostration, collapse, and finally coma after two to five days. While atropine is advised, there is frequently little response resulting in the majority of cases. If consciousness is regained, the patient is severely ill for an additional four to five days.

Symptoms of *Amanita muscaria* (fly mushroom) poisoning are caused largely by the poisonous alkaloid muscarine which is closely related to choline. However, other poisons are also contained in the species. Muscarine has a cholinergic action plus nicotine-like and curare-like effects[4,8]. Symptoms are rapid in onset and are characterized by salivation, diarrhea, slowing of the pulse, and protracted coma. Poisoning symptoms respond to atropine, and there is rapid recovery after consciousness is regained. Some cases may terminate fatally, however.

In this case, positive identification of the mushroom were not possible. Although the dog had been observed earlier attempting to eat a species appearing to be *Amanita muscaria*, when and whether the animal returned to eat this one, or similar ones, is not known. The muscaria was later positively identified as growing in the area. The case demonstrated similarities to both types of poisoning.

Therapy

Use of all potentially helpful agents is indicated in both types of mushroom poisoning. Emetics, gastric lavage, adsorbents and demulcents, atropine, and intravenous infusions to combat dehydration may be indicated[7]. Not all of these agents, of course, can be applied in the comatose patient.

In this patient, exogenous hydrocortisone was apparently lifesaving. Adrenocortical steroids are probably not specific in mushroom poisoning, but serve to support the animal in stress condition in which need for hydrocortisone is increased many times. If homeostasis is to be maintained, additional hydrocortisone must be supplied. This restores normal reactivity of the blood vessels to endogenous norepinephrine, thus "triggering" vasopressor effect, returning blood pressure and blood volume to normal with ultimate restoration of hemodynamics. There may also be a direct detoxifying mechanism involved.

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"Receptive Area"

The U. S. Public Health Service has declared the southern third of the United States including Florida as a receptive area to yellow fever. The disease does not now exist in this region but conditions exist which would allow its development if introduced from abroad (presence of the *Aëdes aegypti* mosquito).

The action gains significance in the findings that incidence of yellow fever is building up in monkeys throughout Latin America.

Some Current Therapeutic Agents In Veterinary Medicine

KENNETH B. HAAS,* D.V.M., Kalamazoo, Michigan

OVER the year past, advance in the field of veterinary therapeutic agents has been rapid. The combined efforts of research workers and veterinarians have resulted in the constant improvement of many of the older drugs and technics of using them, and in the discovery of innumerable new ones. As these agents have been made available, veterinarians have made prompt application of them. The result has been an improved standard of therapy, improved animal welfare, and increased profit to the owner.

Because progress has been so rapid, the practitioner has usually found it difficult to keep abreast of the more recent developments. This article summarizes a few of the more important advances in the field of veterinary therapeutics.

Antibiotics

Tetracycline and neomycin are two antibiotics that received increasing notice during the past year. Tetracycline is being used chiefly systemically, neomycin chiefly topically and as an antidiarrheal compound, but also for systemic effect.

Tetracycline

Tetracycline is the newest broad-spectrum antibiotic. Intramuscular or intravenous administration is advisable in ruminants because, as with other antibiotics, oral administration may suppress normal rumen flora.

Uses. Since the antimicrobial spectrum of tetracycline includes both Gram-positive and Gram-negative forms, there is wide variety of large and small animal indications. These include: Endometritis, enteritis, tonsillitis, pneumonia, calf diptheria, foot-rot, mixed bacterial complications of virus disease, and urinary tract infections.

Administration and Dosage. Oral dosage for large animals is 5 to 10 mg. per lb. of body weight; 10 to 50 mg. per lb. for dogs and cats. Intramuscular dosage is 1 to 2 mg. per lb. in large animals; 2 to 5 mg. per lb. in dogs and cats. These are average daily doses for oral and intramuscular administration and should be given in divided daily doses, if possible. Intravenous tetracycline is administered by slow injection, dilution and administration is according to the manufacturers' directions. Dosage is the same as for intramuscular use. Intramammary ointments and intrauterine boluses are also available.

Neomycin

Neomycin is also broad-spectrum in effect, but is rarely administered systemically, only occasionally. It is intended chiefly for oral antidiarrheal and topical use.

Uses. Neomycin is bactericidal against both Gram-positive and Gram-negative organisms, including the genera Proteus and Pseudomonas. Indications are: Gastrointestinal conditions characterized by diarrhea or "scouring", superficial eye infections, skin infections, abrasions and wounds, suppurative otitis externa, and bovine mastitis. It is an ideal intestinal antiseptic. Intramuscular administration has been described in dogs.

Administration and Dosage. As an antidiarrheal in calves, 1 to 2 gm. initially, followed by 0.5 to 1 gm. on subsequent days; in swine, 0.5 to 1 gm. initially in milk or feed concentrate, repeated as necessary; in dogs, 0.25 to 1 gm. daily; in cats, 0.12 to 0.5 gm. daily. These total daily doses should be divided. Topical powders, eye and skin ointments, intrauterine tablets, and sterile powder for intramuscular use are also available.

Neocycin is also combined with cortisone, prednisolone or hydrocortisone for topical use in eyes or on the skin, with hydrocortisone for intra-articular injection, and with several other drugs for intramammary or antidiarrheal use. Some of these forms and uses will be discussed under other heads.

Sex Hormones

Sustained-action male and female hormones and progesterone have been used to a greater extent than ever before during the past year.

*Veterinary Medical Department, The Upjohn Company, Kalamazoo, Mich.

Testosterone Cyclopentylpropionate

This new ester of the male hormone provides prolonged androgenic action, simulating desirable physiologic effects.

Uses. Uses include in male animals: Anaphrodesia, reduced semen volume, chronic eczema and muscular weakness in old dogs, cryptorchidism, and sterility. Use has also been suggested in the palliative treatment of multiple mammary tumors in bitches and as a lactation suppressor.

Administration and Dosage. For impotence and cryptorchidism in dogs under 30 lb. body weight, 10 mg.; over 30 lb., 25 mg. The dose is given intramuscularly and may be repeated in seven to 14 days. For impotence in bulls, the dose is 100 to 200 mg.; in rams, 25 to 50 mg. repeated in both cases in seven to 14 days if necessary. Suppression of lactation is most successful prior to nursing, or when administered antepartum.

Estradiol Cyclopentylpropionate

This is an ester of the female hormone, a new departure from the historically-used diethylstilbestrol in oil.

Uses. Indications include: Anestrum, pyometra, uterine atony, persistent corpus luteum, mummified fetus and retained placenta in cows, vaginitis in cows and bitches, urinary incontinence and pseudopregnancy in bitches and nonmalignant prostatic hypertrophy in dogs. It is of palliative value in anal adenoma of aged male dogs.

Administration and Dosage. Administration is by the intramuscular route. Dosage recommendations are specific for various animals and for different conditions.

Progesterone

The luteal hormone is not new in itself, but the past year has seen greater use of progesterone and application for diverse indications.

Uses. Indications are: Habitual or threatened abortion, nymphomania, sterility, and mammary underdevelopment.

Administration and Dosage. Administration is by the intramuscular route, 50 mg. per 100 lb. body weight in large animals; 1 to 2 mg. per lb. in dogs and cats. Dose may be repeated in five to ten days, as required.

Adrenocortical Hormones and Analogs

The adrenal cortex hormones, cortisone and hydrocortisone, exert anti-inflammatory effects (antiarthritis), metabolic effects (antiketotic), and antishock effects. Newer forms and analogs are now coming into therapeutic prominence in the veterinary field.

Prednisone

This is a newer analog of cortisone (delta-1-cortisone).

Uses. Prednisone is useful in exactly the same manner as the parent steroid, but at reduced dosage.

Administration and Dosage. Prednisone is effective in only one-fifth the dose of cortisone. Oral suppressive doses in dogs are 10 to 20 mg. daily, usually for not more than three days; maintenance doses, 2.5 to 5 mg. daily, as required. In bovine ketosis, 100 to 400 mg. has been recommended.

Prednisolone

This is an improved hydrocortisone (delta-1-hydrocortisone).

Uses. Prednisolone is likewise effective as is the parent substance and for the same indications, but at reduced dosage.

Administration and Dosage. Prednisolone is effective in only one-third the dose of hydrocortisone. Oral daily doses for 5- to 15-lb. dogs are 1.25 mg.; for 15- to 40-lb. dogs, 1.25 to 5 mg.; for 40- to 80-lb. dogs, 2.5 to 12.5 mg.

Intra-articular Hydrocortisone

The localized treatment of rheumatoid or traumatic arthritis may be carried out with hydrocortisone acetate in aqueous suspension.

Uses. Intra-articular hydrocortisone may be used as; (1) an adjuvant to systemic therapy, (2) when systemic therapy is contraindicated, (3) when the disease process is limited to one or a few peripheral articulations, (4) in conjunction with certain orthopedic procedures. Traumatic arthritis, osteoarthritis, periostitis, bursitis, synovitis, tenosynovitis, and tendinitis are indications in large and small animals.

Administration and Dosage. Routine aseptic preparation of the area is made with a dry syringe. The dose will vary with the size of the joint. The average dose for a major joint in large animals is 125 mg.; in the dog, 25 mg. The recent addition of neomycin to hydrocortisone for joint injection serves as prophylaxis against bacterial contamination of the joint. Preliminary work suggests this combination to be of value in pyosepticemia (joint-ill) of foals.

Intramuscular Hydrocortisone

Hydrocortisone, free-alcohol, in aqueous

suspension is intended for systemic therapy of both large and small animals.

Uses. Indications include bovine ketosis, acute hypersensitivity reactions, rheumatoid and osteoarthritis, and physiological support in the prevention or treatment of shocklike states in poor surgical risks, severely injured animals, severe systemic infection, and emergency surgery.

Administration and Dosage. Administration is by the intramuscular route. Dosage for horses is 250 mg. to 1.0 gm.; for cattle, 250 mg. to 1.5 gm.; for dogs, 25 mg. to 75 mg. The dose is injected every 24 hours. After improvement results, dose is gradually reduced until the smallest maintenance level is established.

Intravenous Hydrocortisone

Several forms of intravenous hydrocortisone have recently been made available, but the one most adaptable to the needs of the large or small animal practitioner is hydrocortisone sodium succinate, a water-soluble salt. This has the advantage of being directly injectable into the vein over a short period, rather than being necessarily administered by slow intravenous infusion. Hydrocortisone sodium succinate may be administered by infusion if desired, however, but other alcohol forms can not be rapidly injected without danger of phlebitis.

Uses. This preparation can be lifesaving in selected cases of surgical shock. It is indicated in the prevention or treatment of shocklike states, poor surgical risks, severe injury, overwhelming systemic infection, acute allergic reactions, acute asthma, and acute bovine ketosis.

Administration and Dosage. Injection is by the intravenous or intramuscular route. Dosage is 20 to 100 mg. for small animals, 100 to 600 mg. for large animals.

Other Therapeutic Agents

The past year has also witnessed introduction of new therapeutic agents in other fields: New forms of adrenocorticotropic hormone (sustained-action ACTH), short-acting intravenous anesthetics (thiamylal sodium), blood coagulants and anticoagulants, and many others. Evidence has been accumulating in the literature that piperazine compounds are effective anthelmintics.

Piperazine Anthelmintics

Piperazine adipate, hydrate, and citrate, have effective anthelmintic action and have been used extensively in eliminating human enterobiasis (pinworms) and less extensively in human ascariasis.

A number of articles, particularly in British literature, have discussed use of piperazine anthelmintics in domestic animals. As a group, the piperazines are noninjurious, nontoxic, effective, and easily administered without use of a purge. The piperazine-carbon-disulfide complex is economical for use in swine, may be mixed into wet or dry feed and releases two known anthelmintic principles. It has been described as 95 to 100% effective against swine large roundworms and 85% against swine nodular worms.

Piperazine adipate in particular may prove extremely useful in the small animal field, where it has demonstrated no toxic side effects even when administered in relatively massive doses. It has been used in puppies several weeks old, cats, and adult dogs without untoward results. It may be administered in tablet form or placed in the feed. Pretreatment fasting is unnecessary. Results are promising.

Research is continuing rapidly in diverse fields. Search will be made for new antibiotics, hormones, and vitamins. New agents will be sought for treatment of superficial and deep mycotic infections, trichomoniasis, and other diseases, both infectious and parasitic. Drugs will be evaluated for bronchodilator effect, parenteral nourishment, diuresis, anabolic action, and pressor and oxytocic effect. The end is not yet in sight.

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A Preliminary Report on the Use of Variton® Cream in Small Animal Practice

LEE R. PHILLIPS, D.V.M., Lakewood, Colorado

The problem of moist dermatoses, arising from known or unknown and occult etiology, is a challenging one continuously. Many of these have little in common either as regards history or symptoms.

Many agents have been used for relief of symptoms in combination with agents designed to remove the basic cause or alone. This report is submitted with tabulation of clinical results following application of a new agent made available designated as variton cream. Variton cream, contains 20 mg. diphemanil methylsulfate in each gram of a water washable base.

It has been postulated that many skin conditions are aggravated by overactive secretion of acetylcholine at the cholinergic neuro-effectors[1]. The concept that a drug with anticholinergic activity (acetylcholine blocking) might be of value in these conditions has been reported by Nelson[2] and Parish[3]. Antiacetylcholine activity of variton cream has been demonstrated experimentally[4]. Most dermatoses are accompanied by pruritus. This is definitely a matter of prime importance since the irritation by scratching is likely to initiate secondary infections. In many cases the relief of scratching will allow the lesions to heal without adjuvant treatment. Selitto and Randall[5] have demonstrated the ability of compounds of the same structural type as variton cream to reduce edema in inflammation. This anti-inflammatory action also will tend to reduce further histamine release and further tissue damage.

Clinical Trials

Dermatologic conditions treated and followed up include 21 cases of moist eczema, one of otitis externa, one of moist eczema with ear canker, and one of ventral dermatitis. Of the 21 moist eczema, five were previously treated with other medicaments without favorable response. The ventral dermatitis case (a possible allergy) failed to respond after one week's treatment but recovered on administration of meticorten®.

In these clinical trials application of variton cream was preceded only by clipping and removing hair around lesions. Thereafter, the cream was applied locally three to five times daily for the first two or three days. As improvement was noted, number of applications was reduced to twice daily until complete healing was evident. If signs of improvement do not appear within four to five days, reexamination for exciting cause is recommended. With regard to cases involving the ears, after cleansing of the area, cream was massaged in and around the ear canal. In a recent publication by Koger (*Vet. Med.*, 50:713 [Dec.], 1955) there was mention of two cases of otitis externa responding to treatment with this new agent.

Results of clinical studies are summarized in table I.

Discussion

Topical application of an anticholinergic substance, variton cream, to cases of moist dermatoses has proved beneficial in the majority of my cases. The exact mechanism of action is not known. However, I believe that mainly through its anti-inflammatory action, this agent suppresses the further release of histamine and acetylcholine which are largely responsible for associated pruritus. Unless secondary infection has already begun, most of the recuperative processes of the animal will be stimulated for recovery. This is the first anticholinergic of its kind to be offered in an ointment preparation. The striking benefits are that no observable systemic side effects or sensitivity have been observed.

Summary

Variton cream, a topical anticholinergic preparation has been used successfully in 20 cases of moist eczema, one of otitis externa and one of ear canker. Advantages of this topical agent in these conditions are its ability to: (1) Decrease the tendency of itching and scratching, (2) dry the moist lesion, and (3) reduce inflammation.

In addition, no signs of irritation or stinging on application, irritation developing from its use, sensitivity, systemic effects or staining to the skin have been observed.

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®Schering Corporation, Bloomfield, N. J.

TABLE 1. Summary of Cases Treated with Variton Cream

Patient — Age	History and Symptoms	Diagnosis	Recov. Time (Days)
1. Cocker, male, 2 yr.	Painful, severe skin lesion; 4 days duration	Moist eczema	7
2. Sealyham, (A), male, 7 yr.	Skin lesion left cervical; 3 weeks duration	Moist eczema	10
3. Shepherd, female, 9 yr.	Skin lesions, lumbar region and base of tail; 3 days duration	Moist eczema	7
4. Wirehair, male, 6 yr.	Skin lesions right maxilla; one week duration	Moist eczema	5
5. Collie, (B), female, 1½ yr.	Severe weeping skin lesion, left gluteal region; 2 days duration	Moist eczema	8
6. Ger. Shepherd, female, 2½ yr.	Moist skin lesion, posterior metacarpus; 7 days duration	Moist eczema	7
7. Ger. Shepherd, female, 6 mo.	Severe pruritus and skin lesions of gluteal region; 3 days duration	Moist eczema	7
8. Boston Terrier, (C), male, 8 mo.	Ventral hyperemia on neck, thorax and abdomen; 1 week duration	Ventral dermatitis (possible skin allery)	*
9. Shepherd, male, 7½ yr.	Pain in left external ear canal with moist lesions	Otitis externa	5
10. Shepherd, female, 6 yr.	Pain in perineum. Inverted vulva due to obesity with secondary moist eczema involving inverted tissues	Moist eczema	7
11. Male, 5 yr.	Skin lesions left gluteal region and base of tail	Moist eczema	7
12. Setter, (D), male, 6 yr.	Moist weeping lesions of left hock; 1 week duration	Moist eczema	7
13. Collie, (E), female, 9 yr.	Moist eczema in region of perineum secondary to maggot infestation	Moist eczema	5
14. Shepherd, male, 6 yr.	Moist lesion left gluteal region: 2 weeks duration	Moist eczema	6
15. Husky, (F), male, 4 yr.	Large moist skin lesion in right gluteal region; 2 months duration	Moist eczema	14
16. Poodle, male, 4 yr.	Moist weeping lesion—right mandible; 1 week duration	Moist eczema	7
17. Cocker, male, 3 yr.	Acute severe moist eczema — lumbar region — very painful; 2 days duration	Moist eczema	10
18. Sealyham, male, 7 yr.	Moist lesion right cervical; several weeks duration	Moist eczema	7
19. Springer, male, 14 yr.	Diarrhea resulting in scalding of skin involving perineum and scrotum	Moist eczema of scrotum	7
20. Shepherd, (G), female, 3 yr.	Seasonal eczema every summer for 3 years—inguinal region	Moist eczema	7
21. Shepherd, (G), male, 1 yr.	Pododermatitis; 3 months duration	Moist eczema	10
22. Cocker, male, 2 yr.	Moist lesions ventral to right ear; several days duration	Moist eczema	5
23. Springer, male, 2 yr.	Moist lesions of external ear flap — secondary ear canker	Moist eczema & ear canker	5
24. Boxer, male, 8 yr.	Skin irritation ventral mandibular region; 3 months duration.	Moist eczema	14

(A) Previously treated with boric acid and merthiolate
(B) Previously treated with demerol and phenobarbital
(C) No response to variton cream. The condition cleared after meticorten administration
(D) Previously treated with gentian violet—no results
(E) Maggots removed with lindane
(F) Previously treated with sulfur lotion—no response
(G) Previously treated with skin lotions & antihistamines—no response

A.A.H.A. Annual Meeting — Miami Beach, May 23-26, 1956

The 23rd annual meeting of the American Animal Hospital Association will convene at the fabulous Hotel Fontainbleau, Miami Beach, Florida, May 23-26, 1956.

Dr. W. F. Irwin, President,
American Animal Hospital Association

Dr. James E. Greene, Department of Medicine and Surgery, College of Veterinary Medicine, Alabama Polytechnic Institute, Auburn, program chairman, has announced that a full schedule of technical papers will be presented beginning on Thursday morning, May 24, and extending until 1:00 p.m. on Saturady. Featured will be surgical demonstration by closed circuit television, and discussion and demonstration on radiograph and physical therapy, ocular diseases, orthopedics, and dentistry.

Preconvention plans for the entertainment of members and guests include a golf tournament on May 22, at the Plantation Golf Club, Ft. Lauderdale followed by dinner at the club; and cruise and box supper for Wednesday afternoon and evening to visit the Seaquarium, Florida's newly constructed (cost $2,000,000.) facility for exhibition of marine animals and fish. Other entertainment features will be provided, including the President's Reception and Dance scheduled for Friday evening. In addition time will be available to enjoy the many vacation advantages that do not exist elsewhere.

A postconvention air trip to Havana, Cuba has also been arranged. Dr. Frederico Sanchez, director, Havana Veterinary Hospital with cooperation of Cuban veterinarians will entertain visitors from their arrival time in Cuba at 7:00 p.m. Saturday evening May 26, through Monday, May 28. A technical program also has been arranged by the Cuban Veterinary Medical Association.

Corticosteroids in Animals

(Continued from page 224)

Conclusion

In conclusion, it can be said that these hormones (hydrocortisone, cortisone, their delta derivatives, hydrocortisone sodium succinate, and hydrocortisone cyclopentylpropionate have established themselves as indispensable aids to the control of suffering in animals. They are not "cure-alls" or panaceas. They are best employed as aids to other established forms of therapy and should be regarded with respect by all veterinary physicians.

Undoubtedly, new and more remarkable derivatives of hydrocortisone and cortisone will become available in the future, making for brighter days in veterinary medicine.

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Critical Tests With Piperazine As An Ascaricide In Swine

JAMES E. GUTHRIE,* D.V.M., Ashland, Ohio

As a result of an intensive screen-testing program during World War II a new chemotherapeutic agent, 1-diethylcarbamyl-4-methyl piperazine dihydrogen citrate was found to be effective in the treatment of filariasis of man and animals[1,2,3]. Further investigation revealed that the drug was effective against ascarids in man and in dogs and cats[4,5]. However, high cost of this compound made it impractical as an anthelmintic for domestic animals.

In search for cheaper piperazine compounds, investigators[6,7] found that piperazine, piperazine hexahydrate, piperazine adipate, and piperazine-1-carbodithioic acid were effective against several intestinal nematodes of man and animals. The simple piperazines were noted to be more effective than the more complex substituted compounds.

Inasmuch as piperazine and certain salts thereof are water soluble it was decided to investigate the anthelmintic activity of these compounds when administered in the drinking water to swine. While these investigations were in progress Shumard and Eveleth[8] reported that piperazine citrate administered in the drinking water to chickens was effective for the removal of *Ascaridia galli* and partially effective against *Heterakis gallinae*.

The present report is concerned with the anthelmintic value of piperazine hexahydrate and piperazine sulfate for removing *Ascaris lumbricoides* from swine when administered in the drinking water over a 24-hour period. The technical assistance of Grethel Feiber and Clair Eshelman in carrying out these investigations is gratefully acknowledged.

Materials and Methods

The pigs used in tests herein reported were of various breeds and were either raised from weanling age on contaminated plots at our experimental farm, or were purchased in small groups from neighboring farmers. All animals were confined separately in concrete floored pens for the duration of the test. They were allowed a period of at least a week to become acclimated to the new quarters before treatment was instituted. The feces from each animal were examined by the salt flotation method to determine that they harbored *A. lumbricoides*.

Prior to treatment, drinking water was withheld over night. The drug was administered in the drinking water on the following day and no other water was given for 24 hours, or until the animal had consumed the medicated water.

To prevent the consumption of eliminated worms, feces were collected at frequent intervals each day after treatment and screened daily for ascarids. When no further worms were eliminated, all pigs were necropsied and the entire intestinal tract was examined for the presence of ascarids.

Data

Observations on the efficacy of various doses of piperazine for the removal of ascarids from 61 infected pigs is reported in table I. In the six experiments reported therein, piperazine hexahydrate was dissolved in the drinking water and the medicated water given over a period of 24 hours. In all cases the dosage of the drug is reported as anhydrous piperazine.

In experiment 1, 11 pigs averaging 41.5 lb. eliminated 45.5% of 145 worms after a mean consumption of 27.4 mg. of piperazine per lb. of bodyweight. The individual dosage ranged from 15.8 mg./lb. to 29.9 mg./lb. body weight.

In the second experiment, 16 pigs with a mean weight of 46 lb. eliminated 78.4% of 195 ascarids after an average dosage of 36.5 mg./lb. The individual dosage varied from 31.9 to 40.3 mg./lb. bodyweight.

Eleven pigs in experiment 3 averaged 41.9 lb. at the time of treatment. Their average consumption of piperazine was 48.9 mg./lb. bodyweight with an individual dosage ranging from 44 to 53 mg./lb. Of a total of 282 worms present, 94.3% were eliminated after treatment.

Thirteen pigs in experiment 4 averaging 41.7 lb. consumed 60.7 mg./lb. bodyweight

*Hess and Clark, Inc.

and eliminated 97% of 136 worms. The individual dosage of piperazine ranged from 54 to 66.9 mg./lb. of bodyweight.

In experiment 5, nine pigs averaging 36.3 lb. eliminated 83% of 112 worms with a mean consumption of 86.7 mg./lb. bodyweight. The individual consumption of the drug ranged from 68.2 to 13.9 mg./lb. of bodyweight. Two pigs in this group failed to eliminate a satisfactory percentage of their worm burden after treatment. A 33.5-lb. animal consumed 76.6 mg. piperazine per lb. of bodyweight, but only 20 of 35 worms were eliminated. A 55-lb. pig passed three of six worms after a dosage of 76.9 mg./lb.

From these data it is evident that at a dosage of approximately 45-60 mg./lb. of bodyweight, piperazine is a highly effective ascaricide. In view of the effectiveness at the above levels, further experimental work was conducted to critically establish the efficacy of the drug at a dosage of 50 mg./lb. of bodyweight. Piperazine hexahydrate and piperazine sulfate were administered over a 24-hour period in the drinking water to 31 pigs. These data are reported in table 2.

In experiment 6, piperazine hexahydrate was given at the rate of 50 mg. of piperazine per lb. of body weight to nine pigs averaging 65.3 lb. The dosage was administered to each animal on the basis of the average of the entire group. Thus each pig received the same amount of drug in its drinking water. The drug was given to twelve pigs in one-half of the quantity of water consumed the previous 24 hours. Two pigs were given two-thirds, three received three-fourths, and the two remaining animals received the full amount of water consumed during the previous 24 hours. Of 138 ascarids present, 98.5% were eliminated following treatment. The average consumption of piperazine was 48.8 mg./lb. of bodyweight. The individual dosages ranged from 38.9 to 54.1 mg./lb.

Fig. 1. Ascarid infected pig shown drinking medicated water.

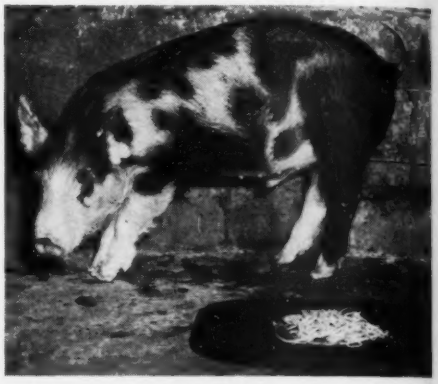

Fig. 2. Ascarids eliminated by experimental animal. Photograph taken 24 hours after the view shown in fig. 1. Many of the worms were passed within eight hours following treatment.

In experiment 7, piperazine hexahydrate was given to 11 pigs at the rate of 50 mg. of piperazine per lb. of bodyweight in the full quantity of water which each pig had drunk during the previous 24 hours. The dosage for each pig was calculated on the basis of its individual weight. The 11 pigs eliminated 386 ascarids of a total of 392 present for an average efficacy of 98.4%.

TABLE 1. Efficacy of Various Doses of Piperazine for the Removal of *Ascaris lumbricoides* From Swine

Exper. No.	No. Pigs	Mean Wt. at Treat. (lb.)	Mean Dosage of Piperazine mg. per lb.	range mg. per lb.	Total Worms Elim. No.	Total Worms at Necropsy No.	Efficacy of Treatment %
1	11	41.59	27.40	15.8 - 29.9	66	79	45.5
2	16	46.1	36.58	31.9 - 40.3	153	42	78.4
3	11	41.9	48.95	44.3 - 53.2	266	16	94.3
4	13	41.7	60.74	54.0 - 66.9	132	4	97.0
5	9	36.3	86.77	68.2 - 113.9	93	19	83.0

Note: Piperazine hexahydrate was used in these tests. Water was withheld over night prior to treatment. Necropsy was 7 days following treatment.

In experiment 8, 11 pigs averaging 96.2 lb. were given piperazine sulfate (46.3% piperazine) at the rate of 50 mg. piperazine per lb. of bodyweight. With an average drug consumption of 46.8 mg./lb., individual consumption ranging from 27.2 to 50 mg./lb., 96% of 104 ascarids were eliminated.

Toxicity Investigations

A 107-lb. Hampshire shote was given a single oral dose of 57 gm. of piperazine hexahydrate (approximately five times therapeutic dose) dissolved in 10 oz. of water. There was considerable salivation following treatment and the animal was excessively thirsty for several hours. Appetite was impaired for one day and feces were partially fluid during this time. One week later the animal weighed 120.25 lb.

Four Yorkshire shotes weighing 111 to 150 lb. were confined together in a concrete-floored pen and given 6.3 gm. of piperazine hexahydrate per gal. of drinking water over a period of 32 days. During this time a total of 1713 gm. of the drug was consumed. The average daily gain per animal ranged from 1.2 lb. to 1.82 lb. for the 32-day treatment period. No evidence of intoxication was noted during the test.

Four other Yorkshire shotes were confined in separate concrete-floored pens and given 6.3 gm. of piperazine hexahydrate per gal. of drinking water for 38 days. These shotes weighed from 54.5 to 70 lb. at the beginning of the experiment and at the time the experiment was terminated, 38 days later, had made an average daily gain of 1.13 to 1.4 lb. The total amount of piperazine hexahydrate consumed by individual animals ranged from 422 to 515 gm. during the 38-day period. None of these manifested symptoms of intoxication during the time they received the drug.

Ten Yorkshire shotes averaging 97 lb. were confined together in a concrete-floored pen and given drinking water containing 32.8 gm. of piperazine as the sulfate per gal. This dosage was approximately ten times the therapeutic level. At this concentration the water was so distasteful that the ten pigs consumed only 4.5 gal. in two days. Thereafter the concentration was reduced by one-half (16.4 gm./gal.) and continued for eight days during which there was a consumption of 51.68 gal. of the medicated water. During the ten-day period, 995 gm. of piperazine was consumed by the ten pigs, which amounted to approximately twice the calculated daily therapeutic dosage for ten consecutive days. At the termination of the treatment period, the average weight of the ten pigs was 85.8 lb., whereas the initial weight was 97.3 lb. During the 24-hour period after the medicated water was discontinued, the ten pigs consumed 22 gal. of plain water and the average weight increased to 98.6 lb. One week after discontinuing the medicated water, the average weight was 108.3 lb. and at two weeks the ten pigs had reached a mean weight of 123.4 lb.

Discussion

Piperazine hexahydrate and piperazine sulfate were administered in the drinking water over a period of 24 hours to 91 infected pigs in eight critical experiments. Both forms of the drug were equally acceptable to pigs in their drinking water. In order to insure that an adequate dosage of the drug would be consumed, the drinking water was withheld over night. Observations on individual animals in these tests suggested that where the optimum dosage of the drug was consumed during the first ten to 12 hours efficacy was somewhat more satisfactory than when the animal took the full 24 hours to consume the dosage. In most cases, large numbers of ascarids were eliminated eight to ten hours after treatment.

A concentrated aqueous solution would probably be the most convenient method for

TABLE 2. Efficacy of Piperazine Hexahydrate and Piperazine Sulfate Administered in the Drinking Water for the Removal of *Ascaris lumbricoides* From Swine

Exper. No.	No. Pigs	Mean Wt. lb.	Drug	Mean Dosage of Piperazine mg. per lb.	range mg. per lb.	Worms Elim. No.	Worms at Necropsy No.	Efficacy of Treatment %
6	9	65.3	PH*	48.85	38.93 - 54.18	136	2	98.55
7	11	81.4	PH	50.0	50.0 - 51.96	386	6	98.46
8	11	96.2	PS**	46.88	27.2 - 50.5	100	4	96.15

*Piperazine hexahydrate.
**Piperazine sulfate.

Note: Water was withheld over night prior to treatment. All animals were necropsied 7 days after treatment.

dispensing the drug. For this purpose, piperazine sulfate is superior to the hexahydrate, as the latter form of the drug tends to crystallize from concentrated solutions.

Five critical experiments involving 60 pigs were conducted to arrive at the optimum dosage of piperazine for the removal of ascarids. The results of these trials indicated that a dosage of approximately 50 mg./lb., or 50 gm./1000 lb. of bodyweight was over 90% effective. A dosage of 60 mg./lb. was only slightly more effective and when the dosage was increased to 86 mg./lb. the efficacy in nine pigs dropped to 83%.

In four critical experiments, using piperazine hexahydrate and piperazine sulfate in the drinking water for 24 hours, a mean dosage of 48.6 piperazine per lb. of bodyweight removed 96.9% of 916 ascarids from 42 pigs.

Summary

Piperazine hexahydrate and piperazine sulfate appear to be equally acceptable to swine when administered in the drinking water. In order to assure an adequate intake of the drug, it is considered advisable to withhold drinking water over night prior to treatment.

Critical tests on 42 pigs in four different experiments indicate that an average dosage of 48.6 mg. of anhydrous piperazine per pound of bodyweight was 96.9% effective for the removal of 916 *A. lumbricoides.*

On the basis of experimental evidence it is suggested that the optimum dosage of anhydrous piperazine is approximately 50 mg./lb. of bodyweight.

Toxicity studies on 19 animals indicate that piperazine hexahydrate and piperazine sulfate are well tolerated in a single dose and when given continuously in the drinking water at a level in excess of the therapeutic dose for as long as 38 days.

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Special Project of the Women's Auxiliary

At the Minneapolis meeting of the Women's Auxiliary to the American Veterinary Medical Association, a Memorial Fund was established to augment the Student Loan Fund, long time project of this group.

Arrangements have been made through the Executive Board to receive cash gifts or gift legacies in memory of deceased veterinarians or their families from relatives and friends. These may be sent in lieu of floral offerings in the event that families request 'no flowers'.

A special memorial card will be sent to the family of the deceased with the name of the donor or donors inscribed. The donor also will receive acknowledgment of the gift. Checks should be made payable to the treasurer, Mrs. John D. Stevens, P. O. Box 5, Sequim, Washington.

Gifts will serve a many-fold purpose by enlarging funds available for loan to worthy veterinary students. In this fashion a lasting memorial is established as a fund available for use and reuse perpetually.

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An entomologist of the Texas Department of Health who had been actively engaged in research on bat rabies succumbed to that disease. Accidental inoculation of virus from infected bats is presumed to have been the mode of infection.

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Of the total cash receipts ($2,859,000,000) for agricultural products grown in California during 1955, $917,000,000 resulted from sales of livestock including poultry.

Some Nervous Disorders Of Horses And Cattle†

JOHN T. McGRATH,* V.M.D., Philadelphia, Pennsylvania

THE diagnosis of a neurologic disorder in an animal, as with other diagnosis, is carried out in a differential deductive manner. With the aid of symptoms evidenced by the animal, the practitioner must localize the area or areas of the nervous system affected, must have knowledge of the potential causes of neurologic symptoms in any given species of animal, and as well, must realize the potential neuropathology for the different species.

For differential diagnostic purposes we have utilized the following clinicopathologic classification which is of value for a fundamental beginning:

1. *Congenital Abnormalities.* This group includes neurologic syndromes and/or lesions of the nervous system which are acquired at or preceding birth. They may or may not have a hereditary basis. Symptoms manifest at birth or shortly thereafter may impose little diagnostic difficulty on the practitioner; the congenital syndromes which are not evidenced until later life make diagnosis difficult or impossible.

2. *Trauma.* This group includes animals exhibiting nervous symptoms referable to injury of some type, either direct or indirect. Neurologic syndromes vary with both the site and extent of injury. There may result physiological malfunction of the nervous system without obvious anatomic alteration (concussion), or more frequently, nervous malfunction with discernible pathology (contusion). The latter is generally but not always present with fracture or fracture-dislocation of the enveloping skeletal system, that is, the cranium or vertebral column. Nervous tissue contusion is evidenced generally by circulatory disturbances such as hyperemia, hemorrhage, edema, and necrosis. These may occur singly or in any combination.

The author of this article has prepared a textbook entitled, Neurologic Examination of the Dog, in which is presented the several basic steps necessary to a proper neurologic examination.

The text material is prepared for the practitioner specializing in small animal medicine, but many others will find it of practical use. Lea and Febiger, Washington Square, Philadelphia, are the publishers. Price for this 181 page book is quoted as $5.

3. *Inflammatory and Infectious Diseases.* This group includes various nonspecific inflammatory conditions as well as the specific infectious diseases which involve the central nervous system of domestic animals. Here it is important that the practitioner understand the usage of such terms as meningitis, encephalitis, myelitis, or any combination of these. Meningitis implies an inflammation (usually purulent) of the arachnoid and pia mater, or leptomeninges. Encephalitis is an inflammation of the brain, while myelitis signifies an inflammation of the spinal cord. The terms are frequently combined as in equine encephalomyelitis, listeria meningo-encephalitis, or meningo-encephalo-myelitis. In this group there must be knowledge of the incidence and clinical symptomatology of the various infectious diseases affecting different species such as listeriosis in the sheep and cow, encephalomyelitis of horses, and meningo-encephalitis of hog cholera.

4. *Neoplasma.* The role played by primary or secondary neoplasms of the central nervous system can be minimized with but one exception. Lymphosarcoma, especially in bovine (rarely in the pig), is a common cause of posterior incoordination, paresis, or paraplegia.

5. *Metabolic and Toxic Disturbances.* This group of conditions is a common cause of neurologic syndromes in large animal practice, especially in horses and cattle. The brain of all species demands a constant and adequate supply of oxygen and glucose for normal metabolism and thus normal function. Any systemic or visceral disease producing anoxia (oxygen lack), or hypoglycemia (low blood sugar) may reflect itself *via* neurologic symptoms. In large animals many mineral deficiences or excesses are evidenced by nervous

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symptoms as well as neuropathology. Certain vitamin deficiences are manifested by a variety of neurologic syndromes. A number of intoxications and metabolic diseases fall into this category.

Utilizing the above classification, the following conditions have been observed in the equine and bovine species.

Congenital abnormalities most commonly observed in horses are hydrocephalus and "wobblers". Internal hydrocephalus, a dilatation of the ventricles of the brain, is usually manifested (if at all) soon after birth. Clinical signs are those of a "dummy" animal. Extreme dullness or lethargy, poor coordination, stumbling, and abnormal postures on standing —such as crossing the front legs—are constant symptoms. In many cases, there is deformity of the cranium with bulging and open fontanelles. Equine "wobbles" is applied to a syndrome characterized by an incoordination of locomotion, especially in the hind limbs, although occasionally in the forelimbs as well. There is no paralysis, muscular weakness, or loss of sensation *via* pin pricking. The condition is seen especially in yearlings, although it may not manifest itself until two, three, or four years have passed. Thoroughbred and Standardbred animals most frequently are affected although the syndrome has been described in draft animals and mules. The clinical syndrome suggests a proprioceptive malfunction, or one in which there is asynergy. Clinically, the moving animal wobbles from side to side; the limbs are lifted too high and are improperly placed to balance the body. The latter is seen particularly when the animal is circled or backed up. Some animals evidence more marked symptomatology when blindfolded.

Trauma in the horse with obvious skeletal pathology is observed occasionally. In our series of cases, cranial fracture has been seen in association with severe struggling following anesthesia—a more or less individual idiosyncrasy. In addition, fractures have been associated with falls, particularly racing animals. Vertebral fracture or fracture-dislocation most often involved the cervical region and commonly caused a tetraplegia. We, however, have observed a few racing animals in which wobbler symptoms were simulated by a cervical fracture. It is probable that a number of neurologic signs occasionally observed in racing stock (many times reversible) are related to spinal cord concussion or contusion.

Inflammatory and infectious diseases of the equine nervous system include purulent (bacterial) meningitis, cholesteatoma, and various specific infections; for example, rabies, equine encephalomyelitis. Purulent (bacterial) meningitis with multiple neurologic manifestations has been encountered in the horse as a phenomenon secondary to sinusitis and alveolitis. Cholesteatoma, a chronic inflammatory lesion of the choroid plexus of the fourth or lateral ventricles of the brain, is a common finding in older animals. When the lesion becomes large enough to induce obstruction of the ventricular system, there may result an acquired hydrocephalus—again manifested by so-called "dummy" symptoms. Specific infections affecting the nervous symptoms must be considered in differential diagnosis. These are completely discussed in appropriate texts and journals.

The rare incidence of neoplasms affecting the nervous system of horses does not warrant a clinical or pathological discussion.

Metabolic and toxic disturbances with resulting neurologic manifestations are especially important. In this group of conditions the medical history as well as the general physical examination frequently aid clinical diagnosis. Specific toxic disturbances of note include tetanus, botulism, and moldy corn poisoning. Of all domestic animals, the horse is affected most frequently with tetanus. Symptoms include tetanic muscular spasms of the body with the typical saw-horse posture. Botulism is essentially characterized by paralysis, especially of the tongue and pharynx (difficulty in swallowing); death is usually the result of respiratory paralysis. In addition, ataxia, visual disturbances, and early prostration are prominent features of this intoxication. Moldy corn poisoning in horses has been described for many years. A neurologic syndrome of short duration with death occurring in two or three days is the most typical course. Nervous symptoms observed have included depression, drowsiness, imparied vision, pharyngeal paralysis, muscular twitchings, incoordination and circling, and prostration with occasional animals showing rolling movements. All observers agree that the disease is related to the ingestion of moldy corn and that severe outbreaks are related to prolonged wet weather when corn matures late. It should be emphasized also that digestive and liver malfunction may result in neurologic-syndromes in the horse and differential diagnosis is not always simple.

Congenital abnormalities most commonly

observed in cattle include hydrocephalus and cerebellar hypoplasia. Congenital hydrocephalus in the calf may cause various nervous symptoms, but generally is reflected by disturbance of coordination as well as posture. As in horses, a deformed cranium is of diagnostic significance. Cerebellar hypoplasia is characterized anatomically by a cerebellum of small size or incomplete development. The condition appears to have a high incidence in Hereford calves although other breeds may be affected. Clinical symptoms are usually manifested at birth and include incoordination or ataxia. Frequently the animals evidence inability to stand or posture themselves. There may be hyperkinesia (involuntary motor movements), hyperesthesia, and opisthotonus or dorsal head retraction.

Traumatic injury to the central nervous system is rare in cattle although occasional cases of vertebral fracture or fracture-dislocation are recorded. As in horses, vertebral trauma is most common in the cervical region.

Inflammatory and infectious diseases constitute an important group. Purulent (bacterial) meningitis is seen more commonly in cattle than in any other domestic animal. This condition is noted especially in animals one to five days of age, and particularly in dairy breeds. Symptoms include an inability to stand or suckle with only an occasional case evidencing temperature elevation, neck rigidity, and opisthotonus. In our series of cases, the dairy herd affected usually had a history of poor management and sanitation—over a period of a year there were usually two, three, or four cases in the same herd. Meningitis is seen also in older calves in association with umbilical infections, sinusitis following dehorning, and purulent arthritis. Brain abscesses, usually in a younger age group, are also more common in bovine than in other species. For differential diagnosis the practitioner must have a knowledge of the incidence and clinical signs and symptoms of specific infectious diseases such as listeriosis, rabies, and bovine encephalomyelitis.

In general, neoplasms of the central nervous system are not significant, with the exception of lymphosarcoma. In our series of necropsies, the most common cause of posterior incoordination, paresis, or paraplegia in middle-aged cattle was lymphosarcoma. The tumor masses, often multiple in number, occupy an epidural position in the vertebral canal and compress the cord. They may involve any region of the cord but are most frequent in the lumbar area.

Metabolic and toxic disturbances are associated commonly with multiple neurologic syndromes. As with all nervous disorders, a complete history and physical examination is of differential diagnostic value. In the cow such metabolic abnormalities as milk fever, ketosis, and grass tetany should be considered. Various mineral deficiencies are reflected by neurologic disorders. Avitaminosis A, with blindness due to compression-atrophy of the optic nerves, should be included in this group. As in the horse, diseases of the digestive tract, especially the liver, may result in toxic nervous disorders or possibly in hypoglycemia. Many nonspecific intoxications in cattle are characterized by a variety of neurologic symptoms, while poisoning by such agents as lead, arsenic, salt, and cyanide classically precede central nervous symptoms and damage.

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High Blood Cholesterol Associated with Coronary Disease

An increasing amount of evidence is accumulating that amongst populations of different countries incidence of coronary disease and related circulatory anomalies and blood cholesterol levels in man are directly proportional.

A group of investigators, led by Dr. Ancel Keys, director of the Department of Physiological Hygiene, University of Minnesota have collected evidence in various parts of the world. Thinness or fatness of individuals appears to be unrelated to blood cholesterol values but is related to the amount of vegetable or animal fats consumed. Studies in Italy, Japan, and amongst African tribes and elsewhere have indicated that wherever a group tested ate a high fat diet, blood cholesterol was proportionately high and with comparable incidence of coronary heart disease, regardless of whether individuals were fat or thin.

In line with these observations recommendations for reduced fat intake are being emphasized. According to one report 40% of food calories in the American diet are provided by fats now as against 30% 40 years ago. Reports of these findings if substantiated by presently continuing studies forecast possible drastic changes in American eating habits. The matter is of importance to veterinarians and livestockmen considering that most animal source protein foods are also high in fat content. Diet recommendation may tend to reduce meat food consumption.

EDITORIAL COMMENTS

Five Leading Toll-Takers

Importance of the beef cattle industry to American agriculture may be judged by the large place meat occupies in the nation's diet. Production of this animal source protein food consumes the day-to-day energies of about 5,000,000 farmers and ranchers, 4,000 meat packers, 14,000 commercial slaughterers, and 350,000 retail dealers who employ approximately 1,000,000 persons. Investments on ranches, processing plants, transportation and distribution fatalities is immense.

According to the Agricultural Marketing Service, USDA, (1955), cattle numbers totaled (beef and dairy) 95,433,000 head, valued at $8,478,697,000. They were distributed on 75% of farm and ranches all over the nation and returned approximately 15.5% of the total cash income of farmers.

The preceding introduces the published results of an extensive study conducted by the Research Committee of the American National Cattlemen's Association (ANCA) distributed as a booklet entitled, Problems and Practices of American Cattlemen, Bulletin 562, Dec. 1955, Washington Agricultural Experiment Station, State College of Washington, Pullman.

A study was initiated two years ago in an effort to obtain accurate information regarding problems that challenge cattlemen so that a reasonable basis might be provided for intelligent planning for the future. Source of data was a sampling of the 60,000 members affiliated with the ANCA by a questionaire prepared by qualified investigators. This report summarizes information submitted on 1,588 questionaires representing owners and managers of farms on which an estimated 500,000 cattle are maintained. Sampling variation in a study of this size is probably not large and is believed to represent a fair cross section of the total membership of the ANCA.

Important Infectious Diseases

One phase of the study of especial interest to veterinarians relates to disease incidence. There is lack of measure of accuracy of diagnosis and, therefore, some inaccuracies are inherent. This fact likely would be offset by failure to recognize mild attacks so that the figures given may be considered conservative.

Cattle ill from diseases other than nutritional during the course of one year, amounted to 8% of the total. The five most common were listed in order of importance as follows: Pink-eye, calf scours, shipping fever, foot rot, and pneumonia. These five diseases accounted for 77.2% of all illnesses. Brucellosis was listed ninth, leptospirosis tenth, and blackleg 15th in order of importance. Pink-eye was present and a herd problem in nearly half of the herds represented in the questionnaire and afflicted 3% of all cattle. Little area differences were found to exist relative to the incidence of these leading cattle diseases, except that brucellosis appears to be of greatest relative importance in the South and southern areas.

Nutritional Diseases

Bloat and vitamin A deficiency accounted for two-thirds of all reported nutritional diseases of beef cattle. One-fifth of all those reporting mentioned pasture bloat as the most pressing problem in this category; feed-lot bloat ranked third in importance, followed by poisonous plants and urinary calculi, fourth and fifth ranking nutritional diseases respectively.

In contrast to the infectious disease group, marked contrasts as area differences occur in some of the nutritional diseases.

Salt sickness ranked seventh, white muscle disease tenth, and phosphorus deficiency 12th in importance.

Beef Cattle Parasites

Lice, grubs, hornfly, screwworms, and blowfly were listed by cattlemen as most troublesome parasites. Most parasite damage was reported from the South and as was expected, screwworms ranked first in this section. Despite adequate and well-known methods of control, lice were listed as most troublesome in all areas except the South. Gastrointestinal parasites ranked eighth and anaplasmosis 11th in this analysis.

Significance of annual losses attributed to parasites are given in tabular form. Many of the figures included were published last year in Losses in Agriculture while others were obtained from authorities working in various fields. The following estimated annual losses for the United States were given:

Anaplasmosis—reported in about 40 states.

Tick fever—none in U. S. except for an oc-

casional case along the United States-Mexico international border.

Coccidiosis—an estimated total loss among all cattle of $10,000,000. Serious feed-lot problem. Probably present on every farm and ranch where cattle are maintained.

Gastrointestinal nematodes—estimated $12,000,000. to $15,000,000. loss.

Grubs—losses as high as $100,000,000. annually.

Hornfly—$150,000,000. annually.

Lice—$20,000,000. annually.

Liver-flukes—$5,000,000. annual loss. Occurs west of the Continental Divide, in Texas and some other of the states of the South.

Screwworms—$15,000,000. annually. Usually do not overwinter north of Florida and southern Texas.

Stablefly—$20,000,000. annual loss.

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Factors which Influence Purchase of Drugs

The American Medical Association has made and reported on two market surveys to determine factors that influence prescription writing by physicians. Both surveys support the following conclusions as recorded in *Drug Trade News* for January 30, 1956:

1. Physicians are idealists. They think of themselves as professionally dedicated to serving humanity.

2. They favor the drug firm they believe to be professional and resent companies that appear to be primarily interested in profits.

3. A physician extends loyalty to firms he has come to respect and like. He is slow in changing loyalty as shown by his preference for a particular firm's products.

4. The physician is a busy man. If he can classify an advertisement and determine rapidly whether or not the product advertised might prove useful, he is attracted.

5. Physicians are human beings and react as such but are highly sophisticated and insist that drug firms treat them as experts.

The most recent report was made following a one-year study at Fond du Lac, Wisconsin. Interesting comment of investigations was that —"Most physicians have a very poor understanding of the problems and viewpoints of the pharmaceutical industry." The physician can and is willing to do a job of selling the public on the pharmaceutical industry if provided with information to tell his friends and patients. He is more inclined to suspect the pharmaceutical companies of profiteering than does the general public.

Of 55 doctors studied, 32 wrote a total of 260 prescriptions for the current largest selling drug; four wrote over 40% of the total. A physician who is a volume prescriber of one class of drugs was seldom a prescriber of more than one other class. Frequently, completely illogical reason kept certain physicians from prescribing a particular company's product—or on the other hand make him faithful to one company's line.

Comment. A similar study of the purchasing habits of veterinarians would probably reveal some parallel conclusions. Studies of existing factors might prove helpful to veterinarians and professional suppliers in formulating public relations programs.

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"Xeroradiography — Blackboard X-Ray"

A new type of *x*-ray apparatus that employs dry metal plates, which can be wiped off and reused, has been announced by the General Electric Co., *X*-ray Department, Milwaukee, Wisconsin.

Employing the new process, a fully developed *x*-ray picture may be viewed in only 40 seconds. Xeroradiography utilizes a conventional *x*-ray source, but produces an image on a selenium-coated aluminum plate electrostatically charged before exposure. *X*-rays which pass through a body part will discharge the plate in inverse proportion to the density of elements. The result is a latent electrostatic image that is made visible by inserting into a device which sprays it with a powder. This powder adheres to the charged parts (like iron filing to a magnet), gathering more closely in the heavily charged areas than in those lightly charged, thus forming a visible image.

Because of the speed of the process and the elimination of much equipment necessary for development of conventional *x*-ray plates, sponsors believe it may replace present standard methods for certain purposes though not make obsolete standard, wet-processed film. It is expected to cut cost of producing *x*-ray images considerably.

Work toward perfection of these plates is continuing and production for civil defense

use is scheduled. It will be some time before they are available commercially. Since first employed present experimental plates are rated eight times faster than first ones used and there is every reason to expect that further increase of speed and provision for detail can be obtained.

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Correction

It was stated in the article entitled, Removal of the Canine Fourth Premolar Tooth, by Dr. Russell J. Beamer *(Vet. Med.,* 51:121 [Mar.], 1956) that, "To invade the sinus (maxillary), one must select the medial alveolus of the anterior two-root portion of the tooth." This statement is an error of transcription. Opening into the maxillary sinus is made through the alveolus of the posterior root of the fourth premolar to provide necessary drainage in those instances where inflammatory and exudative processes may be responsible for occlusion of the normal drainage opening of the maxillary sinus in the dog.

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Integrity of Drug Manufacturers

This year marks the 50th Anniversary of the Pure Food and Drug Act of 1906. This law and subsequent legislation provides a high code of ethics on the part of all concerned with the production and marketing of food and drugs. It also places great regulatory responsibility on the shoulders of certain government agencies. However, it is recognized that the country can not rely alone on the policing power of government agencies to maintain high standards. Police action can deal with outlaws, but the greatest protection for all of us is the integrity and conscience of those around us. Consequently, the chemical industry must take for granted the fact that one of the largest single cost items in the development of chemicals for agriculture is the research necessary to assure that these can be marketed without introducing a hazard to health.

—Dr. M. T. Goebel

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The 1955 fall pig crop is estimated to be 41,000,000 head, which is 11.5% more than the number reported for a year earlier. Estimates for the spring (1956) crop is 61,058,000 or approximately that for 1955.

Appraisal of Brucellosis Eradication

A five-man advisory group is appraising the federal-state brucellosis eradication campaign now well into its second year of operation. Members of the group include: Dr. W. A. Hagan, dean, New York State Veterinary College at Cornell University, Ithaca; Mr. T. F. Arnold, rancher, Valentine, Nebraska; Dr. C. F. Clark, dean, College of Veterinary Medicine, Michigan State University, East Lansing; Mr. W. D. Knox, editor of *Hoard's Dairyman*, Ft. Atkinson, Wisconsin; and Mr. F. E. Price, dean and director of agriculture, Oregon State College. Dr. C. D. Van Houweling, director, Livestock Regulatory Program, ARS, USDA, Washington, D. C., is the government liaison representative with the group of advisors.

Ten years ago, losses due to bovine brucellosis were estimated at $100,000,000. annually. At least $45,000,000. was the price tag for the disease livestockmen paid in 1955. Efforts toward eradication commenced in 1934, when 11% of cattle tested were found to be reactors. Eradication efforts were relaxed during war years but since active campaigns have reduced total incidence to less than 3%.

Brucellosis, according to best qualified authorities is still killing 250,000 calves every year before they are born; one-third of them in beef herds. Infected cows produce 20% less milk and 40% fewer calves. This estimate of a situation points up the necessity for continued eradication efforts made possible by federal appropriations. An extra $15,000,000. a year has been authorized by Congress for 1955-1956, plus $14,000,000. a year now being spent by cooperating states, are the tools provided to eradicate a costly disease; aim of the current program.

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Veterinarians in the United States may wonder why their British counterparts do not use the title, Doctor. *The Pennant* for January, 1956 states, "The reason is the same as that which caused British surgeons and dentists to reject it—because originally only physicians were accepted into the ranks of gentlefolks, and as such, entitled to recognition as a member of a profession rather than a vocation. In other words, British surgeons, veterinarians, and dentists decline to call themselves doctors in protest against the snobbery which once denied them the use of the title."

PRINCIPLES OF ANIMAL HEALTH

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Cowpox Vaccine

Frankel in the Netherlands *Tijdschrift Voor Diergeneeskunde* (Jan. 1955) indicates the development of an immunizing agent to protect cattle against cowpox, a recurring disease condition annoying to dairymen. Clinical lesions are observed most frequently in the vicinity of and on the teats and mammae, though the viral infection is a general one. As rapidly as teat lesions heal, others, because of the general infection, make their appearance. Because of the contagiousness of the condition, and ease of transmission from animal to animal by the milker's hands, eradication is difficult. An immunizing agent such as that developed in the Netherlands would be welcomed by dairymen and veterinarians in this country.

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Dust Free Hog Lots

Engineers contend that dusty pig-yards can virtually be made dust free by the addition of 2 lb. of calcium chloride to each square yard of dusty surface soil. The calcium salt is extremely hygroscopic when exposed to air so that treated soil becomes moist and heavy so that it does not "blow", and in time packs down to a smooth dust-free surface. It could be of value to prevent coughing in pigs said to be due to dusty quarters. It would have no effect in controlling cough due to ascarid larvae or other parasites.

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Sex Determination of Chicks

There is a report that the sex of unborn baby chicks may be predetermined by treating the fertile egg at the beginning of incubation with an estrogen, or an androgen. If female chicks are desired, eggs are wet for a few seconds in a solution of an estrum producing compound *i.e.* an estrogen, and when males are to be hatched, eggs are similarly treated with an androgen, such as androsterone or testosterone. The injection of the egg with an estrogen or androgen is also said to be effective but sometimes with dire results. The wetting method is claimed to be 98 to 100% effective.

Orinthosis-Psittacosis

Ornithosis designates a virus disease of domestic poultry and birds caused by *Miyagawanella psittaci*. The same virus is the etiological agent of psittacosis, the latter nomenclature referring to the disease affecting psittacine birds. Incidence of the disease as it affects man, psittacosis, appears to be on the increase and is considered as an occupational hazard; poultry workers are affected most frequently. Formerly, the spread of this disease was ascribed to contact with allegedly smuggled parakeets, or at least those imported without benefit of rigid quarantine regulations. Approximately 28 human cases were observed up to 1951; 444 cases during 1955. There appears to be great variation in symptoms in afflicted human patients with extreme prostration and dry cough as the most constant clinical manifestations; lungs may show patchy infiltration. The death rate is said to be about 20% and is of most frequent occurrence in those persons over 30 years of age. Since there is no known immunizing agent, veterinarians can be helpful in the attempted control of the disease in man by warning their clients and others to be certain that psittacine birds whose acquirement is contemplated have been subjected to the legal requirements and tests imposed by federal and state regulations as evidenced by leg bands. Leg bands usually indicate a three-weeks quarantine, a laboratory test, and some autopsies of birds of groups offered for sale.

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Bovine Vibriosis

It has been mentioned previously in this column that it is now a general custom to add antibiotics to bovine semen intended for artificial insemination. By these means many infections are controlled and their pathogenicity inhibited. One of the organisms so affected, or at least made dormant, is *Vibrio fetus* so that if it is present in semen as it is usually processed, no infection of the inseminated individual, from this factor, is caused. However, if such semen has glycerine added in the deep freezing process, the Vibrio is apparently reactivated. Some virgin heifers so fertilized have contracted genital vibriosis.

POULTRY PRACTICE PROBLEMS

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Pullorum Disease Eradication

The University of Massachusetts has recently published its 35th annual report of pullorum disease eradication in Massachusetts Control Series Bulletin 165. A total of 1,169,822 tests on chickens were made in 1954, and only 0.13% of these gave positive reactions. For the tenth consecutive year, over 1,000,000 birds per year have been tested with over 95% of the flocks having no reactions on the original test. In 1954-55 98.54% of the flocks were non-reacting. These are significant data that indicate that it is possible to maintain pullorum-free flocks year after year by following a rigid well planned program of eradication. Veterinary practitioners can aid in prevention of pullorum disease by advising clients to purchase only chicks, poults, and hatching eggs from hatcheries and flock-owners that maintain flocks that meet the qualification of U. S. Pullorum-Passed or U. S. Pullorum-clean grades.

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Newcastle Disease, Infectious Bronchitis and Fowl Pox Vaccination

The Department of Veterinary Science, University of Massachusetts has the following to say regarding vaccination against these three common diseases (*Featherfax*, Nov. 15, 1955):

It is common knowledge that planning and carrying out an immunization program offers problems that vary greatly from farm to farm. Immunization programs must frequently be tailored to satisfy individual farm needs.

The vaccination schedule offered here is expected to produce satisfactory immunization for most flocks in Massachusetts. The schedule allows the use of combination vaccines wherever possible. The general recommendations which follow will prove helpful:

1. Plan a definite immunization schedule that has been recommended as effective.

2. Plan a suitable hatching and rearing schedule that will permit a satisfactory vaccination program.

3. Vaccinate only healthy flocks.

4. Obtain an adequate amount of vaccine, and handle it properly.

5. Apply vaccines according to instructions. Record the brand name of the vaccine, serial number, and the expiration date. Samples of unopened vaccines should be retained for future checking in case a failure in vaccination occurs.

Give proper postvaccination care. Observe the flock daily and provide the best management possible.

7. Instances of apparent adverse postvaccination reaction should be referred to a diagnostic laboratory for further study.

Chickens

Newcastle Disease—Broilers. Water or dust method at 2-3 weeks of age. Revaccinate four weeks prior to egg production with the water, dust, or spray method. (Wing web vaccine may be used four weeks prior to egg production, but this vaccine occasionally produces a severe reaction.)

Broilers. Vaccinate only when previous flocks have been seriously affected as a result of the disease. Spray, dust, or water method at 2-3 weeks of age.

Replacements: Spray, water, or dust method at 3-5 weeks of age. (The spray method at this age is not recommended for combination with N.C.D. vaccination). Revaccinate by the spray, water, or dust method four weeks prior to egg production.

Fowl Pox. Wing web method at 10-12 weeks of age.

Turkeys

Newcastle Disease. Vaccinate poults only if the infection exists on the farm or in the community. Vaccinate breeders four weeks prior to mating.

Fowl Pox. Administer fowl pox vaccine in the thigh at 10-12 weeks and revaccinate breeders four weeks prior to mating.

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It is estimated that the adult fowl has approximately 8,000 feathers.

The Poultryman is a Good Client

The accompanying photo and comments were supplied by Dr. F. C. Tucker, practitioner, Claypool, Indiana.

Doctor Tucker graduated from McKillip Veterinary College in 1909. He has concerned himself with poultry diseases since 1924, and for the past 30 years avian practice has consumed a major portion of his time. "In fact," states Doctor Tucker, "if it had not been for my poultry practice and especially the program for the control of pullorum disease during the stress years of the early 1930's, it would have been difficult to educate my two sons; Marshall, the eldest, graduated from the Indiana College of Medicine in 1934 and Carl from the College of Veterinary Medicine, Ohio State University in 1935."

The position of the poultry industry in Kosciusko County (Doctor Tucker's practice area) can be judged from the following figures representing income from agricultural practices for 1953:

Poultry	$8,500,000.
Hogs	5,750,000.
Cattle	3,500,000.
Dairy	3,250,000.
Corn	1,500,000.
Wheat	500,000.
All others	2,000,000.
Total	$25,000,000.

It may be observed that income from poultry in Kosciusko County almost equals the total income for hogs and cattle and represents approximately one-third of the total income from agriculture. It is likely that Doctor Tucker's application of veterinary science to the problems of the industry in his practice area has lent support to the development of this industry.

Poultrymen, according to Doctor Tucker, appreciate professional service and are willing to pay a fair fee for it. They are good clients.

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Cut Spring Pig Crop

The Minnesota Reporting Service of the USDA states that the number of sows farrowing pigs in the spring of 1956 (Dec. 1, 1955-June 1, 1956) in nine Corn Belt states will be down 7% from figures reported for a year earlier. This apparent evidence of reaction to low hog prices is expected to be reflected in higher prices paid for market swine this fall.

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You'll do better with *the Veterinarian's Clipper*

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Animals are more docile and easy to handle when clipped with the smoother, quieter Oster. And there is a blade size for every need . . . general, plucking length clipping and surgical shaving.

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Optimum quantity of fat that can be added to broiler rations appears to be approximately 8%.

Dr. Frank C. Tucker observing bird presented by client prior to autopsy.

Classified Advertisements

Twenty-five words or less, $3.50—minimum charge; additional words, 10 cents each. Replies sent care VETERINARY MEDICINE. 50 cents additional to cover forwarding postage. Remittance must accompany order.

Names of classified advertisers using V.M. key numbers cannot be supplied. Address your inquiry to key number, care VETERINARY MEDICINE, Suite 803, Livestock Exchange Building, Kansas City 2, Missouri, and it will be promptly forwarded to the advertiser.

To assure inclusion, copy must be supplied by the 5th of the month preceding date of issue (January 5 for February issue; February 5 for March issue, etc.).

NEW JERSEY: Fully equipped small animal hospital. Long established. Main highway. Excellent buildings. Fast growing area. Good following, in excellent location. Address Box 191, Livingston, New Jersey.

VETERINARIAN WANTED: Leading Midwest ethical biological and pharmaceutical laboratory in veterinary field has excellent opportunity with good future available for young veterinarian interested in professional writing, public and professional relations, and field evaluations of new products. Practice experience desirable. Write, defining interest and stating any experience or training in above fields. Address No. 301 care VETERINARY MEDICINE.

EXCELLENT TEXAS PRACTICE. 90% small animal. Completely equipped hospital. No real estate. Grossed $24,000 last year. $10,000 takes all. Must sell quickly because of other interests. Address No. 302 care VETERINARY MEDICINE.

FOR SALE: Mixed practice, established 29 years, 21 miles from Rochester, New York. Plenty of state work, $5000. for business, drugs, and equipment. Will rent real estate or sell. Wish to retire. Address No. 303 care VETERINARY MEDICINE.

WANTED: Veterinarian for general practice in New England. House can be furnished at small animal hospital. State qualifications and salary expected in first letter. Address No. 304 care VETERINARY MEDICINE.

CALIFORNIA SMALL ANIMAL HOSPITAL: Modern, buildings and real estate including living quarters. Completely equipped, x-ray, instruments, refrigerator, grooming, etc. 100 animal capacity, 30 outside runs. $15,000. down. Terms. Owner retiring. Address No. 305 care VETERINARY MEDICINE.

WANTED: Veterinary Meat Inspector for inspection duty and supervision in five full-time and one seasonal establishment. Local veterinarians assisting. State qualifications, experience, and salary expected. Address Ottawa County Board of Health, Port Clinton, Ohio.

WANTED: Assistant veterinarian for modern small animal hospital in Chicago. State age, marital status, personal data, professional references, salary expected, and experience if any. Possibility of future partnership present. Address No. 306 care VETERINARY MEDICINE.

WANT TO BUY: Lucrative small animal or mixed practice in Pennsylvania, New York or New England. Ample capital available. Address No. 307 care VETERINARY MEDICINE.

DOG BOOKS—GENERAL: All by Will Judy. Canine Genetics (Principles Dog Breeding) $4. Kennel Building and Plans $3. Training the Dog $3. Dog Care and Keeping $2. Subscription $3 one year to Dog World Magazine 3823 Michigan Blvd., Chicago 16.

OPPORTUNITY TO BUY: Veterinary Mobile Unit with four-wheel drive complete for $2620. Excellent condition, 21,000 miles, extras included. Write or call Baldwin Veterinary Hospital, RFD#2, Putney, Vermont, Phone, Brattleboro Alpine 45422.

FOR SALE: Mixed practice in southern Minnesota. Active for 50 years. Price based on drugs, instruments, equipment, office and real estate. Reason for selling—health. All replies confidential. Address No. 308 care VETERINARY MEDICINE.

FOR LEASE: Established veterinary practice, small animal hospital and boarding kennels in suburban Denver, Colorado. For particulars contact the owner, Mrs. Harold F. Newton, Box 233, Adams City, Colorado.

Penicillin and broad spectrum antibiotics have proved so successful in therapy of human anthrax that this disease has lost its past serious connotations. *Herman Gold, M.D.*

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VETERINARIANS

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POULTRY INSPECTION

Permanent positions available at all levels in California's new poultry inspection program. Veterinarians with or without poultry inspection experience needed. All veterinarians in poultry inspection work will act as supervisors only. Attractive career opportunities with 40-hour week, three-week vacation, liberal retirement plan. Applications close June 1. Write at once for information and official application form. Recruitment Section, State Personnel Board, 801 Capitol Avenue, Sacramento, California.

Dairy Goats

The American Goat Society's Yearbook for 1955, a 140-page edition, has been released recently. It features stories of progress in the goat industry. Health factors are discussed in especially prepared articles by Dr. W. R. McCuistion, practitioner at Ft. Worth, Texas and owner of the Mille Fleur herd of French Alpines and Dr. Charles Rager of San Antonio, Texas; the latter now in his 87th year and actively engaged in practice. Doctor Rager's annual custom of roller-skating on birthday anniversaries has caused considerable comment in the press along with his protracted addiction for goat milk.

Practitioners who are offering a complete veterinary service may find useful information in this edition. Extra copies are available from the American Goat Society, Inc., Mena, Arkansas. Price is $1. per copy.

▼ ▼ ▼

The state of Michigan reports 30 cases of human brucellosis for 1955. Majority of these have occurred in person having contact with infected livestock.

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- **Minerals and Vitamins**

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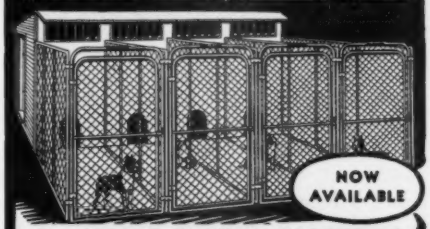

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California farmers spend more than $50,000,000. a year to control pests, according to the State Department of Agriculture in Sacramento.

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the proven effective germicidal agent

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Procaine penicillin G	100,000 units
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Disposable Plastic Syringes

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Procaine penicillin G	750,000 units
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100cc Vial

The D-P-S (28 Gm) formula per 25 cc.

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Tena-Bov contains purified phenothiazine plus lead arsenate in a special formulation. Reports of research show Tena-Bov to be more effective than other anthelmintic drenches tested . . . often as high as 2½ times more effective.

Many Veterinarians have learned to depend on Tena-Bov for assistance with their parasite problems.

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Quick relief for Bone, Bursal or Tendon Lameness

Single Bottle.....$2.00
3 and 1 free.....5.00
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12 and 4 free.....17.00
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Dr. Carl A. Brandly Accepts Deanship at Illinois

Dr. Carl A. Brandly, head, Department of Veterinary Science, University of Wisconsin, Madison has been named dean, College of

Dr. C. A. Brandly

Veterinary Medicine, University of Illinois, effective September 1, 1956. He succeeds Dean Robert Graham who is retiring after heading the College since its establishment in 1944.

Doctor Brandly graduated from Kansas State College in 1923 and afterward (1927-36) held an appointment at the Kansas school as assistant professor of bacteriology. He was a member of the University of Illinois staff from 1936 to 1939.

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Biuret, a urea condensation product, may prove a nontoxic source of non-protein nitrogen to supplement protein requirements for growth and fattening of lambs.

double-duty combination with proved advantages

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PENICILLIN AND DIHYDROSTREPTOMYCIN

Lowers the cost of combined penicillin-streptomycin therapy.

Enhances effectiveness of each antibiotic.

Gives a broader antimicrobial range of activity.

Provides rapid *antibacterial* action.

Provides effectiveness against some organisms which may be resistant to individual antibiotics.

Produces high blood and tissue concentrations, promptly attained.

Results in minimum development of resistant strains.

Is exceptionally well tolerated in *all* species of animals.

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Single-dose vials
Five-dose vials

each dose contains: 100,000 units penicillin G potassium, 300,000 units penicillin G procaine and 1.0 gram dihydrostreptomycin.

COMBIOTIC AQUEOUS SUSPENSION

Single-dose vials (2 cc.)
Five-dose vials (10 cc.)
Fifty-dose vials (100 cc.)

each dose contains: 400,000 units penicillin G procaine and 0.5 gram dihydrostreptomycin.

Pfizer Department of Veterinary Medicine

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Tests also available for Sugar in blood and for Calcium/Phosphorus in blood.

Literature will be sent on request.

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Hog Cholera Research Continued

A hog cholera research program by the Veterinary Medical Research Institute of Iowa State College, Ames, Iowa, will be continued during 1956 and 1957, under a grant from the American Foundation for Animal Health, public relations agency of Associated Veterinary Laboratories, Inc.

During the next two years, the project will be channeled to the study of hog cholera antiserum and virus, and hog cholera vaccines, and special research on the so-called variant virus.

Dr. H. E. Biester, associate director of the Veterinary Medical Research Institute, is in charge of the work, assisted by Dr. L. H. Schwarte. John Mathews, Jr., and Kenneth E. Collins, both chemists, also are working on the project.

A total of $149,000 has been appropriated by Associated Veterinary Laboratories, for the cholera research project from its beginning in 1951 through 1957. Associated Veterinary Laboratories is comprised of 16 producing companies who restrict their sales to veterinarians only.

It Has What it Takes For CHEMICAL DISINFECTION OF SHARP SURGICAL INSTRUMENTS

You can rely on
B-P FORMALDEHYDE GERMICIDE to...
contains HEXACHLOROPHENE (G-11*)

KILL vegetative pathogens and spore formers within 5 minutes.*
KILL the spores themselves within 3 hours.*
KILL tubercle bacilli within 5 minutes.*

*Trademark of Sindar Corp.

Used as directed, it will not injure keen cutting edges, points of hypodermic and suture needles, scissors and other 'sharps' . . . nor rust, corrode or otherwise damage metallic instruments.

IT'S THE ECONOMICAL ANSWER towards keeping annual costs for solutions and instrument replacement and repairs at a minimum. May be used repeatedly if kept undiluted and free of foreign matter.

*Comparative chart sent on request

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PARKER, WHITE & HEYL, INC.
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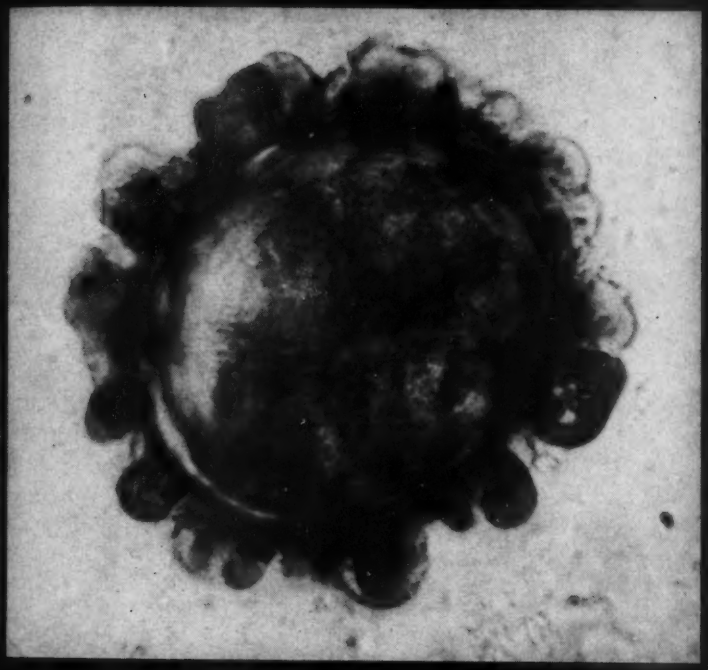
ASCARIS LUMBRICOIDES
indication for one-dose, in-the-feed treatment with this new anthelmintic, which has been shown to attain 95-100% effectiveness against both immature and mature roundworms and 85% effectiveness against nodular worms.



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POLYOTIC OBLETS®: 4's-6 x 4's
POLYOTIC CAPSULES: 50 mg., 25's-100's;
100 mg., 100's; 250 mg., 16's-100's
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POLYOTIC MASTITIS OINTMENT ¼ oz.
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POLYOTIC POWDER 2%: 35 Gm.
POLYOTIC TOPICAL OINTMENT 3%: 1 oz.
POLYOTIC SOLUBLE (Tinted) POWDER:
¼ lb.-½ lb.-1 lb.-5 lb.
AVIANIZED® RABIES VACCINE: (Canine):
1 dose-5 x 1 dose-10 doses-100 doses
AVIANIZED RABIES VACCINE: (Cattle): 10 doses
AVIANIZED CANINE DISTEMPER VACCINE:
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ANTI-CANINE DISTEMPER SERUM AND ANTI-INFECTIOUS CANINE HEPATITIS SERUM: 100 cc.
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5 doses (25 cc.)
FELINE DISTEMPER VACCINE: 1 immunization (2 vials Vaccine, 2 vials Sterile Diluent, 2 cc.)
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400 mg., 25's
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Other products to be added.

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The Practicing Veterinarian is the Key man in any Rabies Control Program

1 **AVIANIZED® RABIES VACCINE Modified Live Virus (Chick Embryo Origin)—Vacuum-Dried *Lederle.* For dogs only.**

The control of rabies requires the vaccination of a minimum of 7 out of 10 dogs. In areas where practicing veterinarians have been able to achieve this goal using AVIANIZED Rabies Vaccine there has been a marked reduction in rabies incidence, human deaths and number of antirabic treatments.

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The problem of rabies in cattle is becoming increasingly important in the United States. The U.S.D.A. has reported 1,931 laboratory-confirmed cases for the years 1952 and 1953. The WHO Expert Committee on Rabies has reported high-egg-passage Lederle-Flury strain Rabies Vaccine for cattle to be antigenic and devoid of pathogenic properties. In field trials during the past 3 years, on over a thousand head, immunity has been demonstrated by challenge (68% survivors vs. 25% in controls).

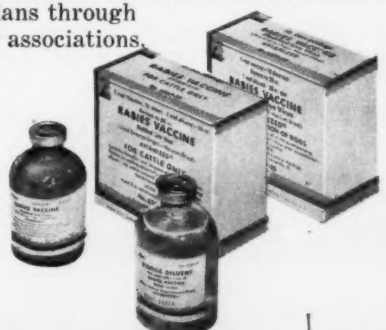
The practicing veterinarian is more liable to day-to-day rabies exposure than any other professional group.

3 **RABIES VACCINE—Semple Vaccine *Lederle.***

For use by physicians in antirabic (Pasteur) treatment of exposed persons.

4 **Antirabies Serum *Lederle.***

For use by physicians in antirabic treatment of exposed persons as indicated. Now available, cost-free to exposed veterinarians through their local veterinary associations.



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IN MILK FEVER

excels even in herds with histories of relapses

NORCALCIPHOS

calcium, magnesium dextrose, phosphorus

Norden calcium solutions are non-precipitating even after freezing.

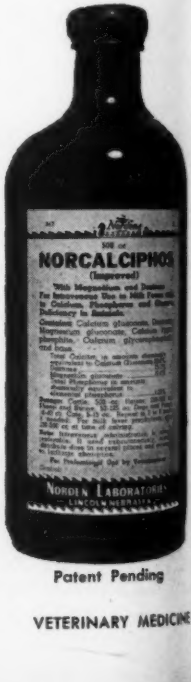
LONGER, MORE EFFECTIVE THERAPEUTIC ACTION Norcalciphos provides calcium, phosphorus and magnesium in metal-organic form for **decreased ionization rate and longer therapeutic action.** In contrast to rapidly eliminated and more irritating inorganic compounds.

EXCELS IN COMPLICATED CASES: Balanced formula, prepared by exclusive Norden process, is especially valuable in complicated cases and in helping to prevent relapses.

LESS IRRITATION: Magnesium is available as magnesium gluconate instead of magnesium chloride—non-irritating and greater therapeutic effectiveness.

2-1 CALCIUM-PHOSPHORUS RATIO especially valuable in complicated cases or in extreme imbalance of calcium-phosphorus blood levels.

Doz. 500 cc $9.50; 3 Doz. @ $9.22; 6 Doz. @ $9.03; 12 Doz. @ $8.55



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DAIRMOL DUSTING POWDER
FOR GRANULAR VAGINITIS

Antiseptic **Astringent**

"THE DAIRMOL WAY"

Compounded under the direction of veterinarians of exceptional experience. Highly recommended by leading herdsmen as the best treatment for the purpose.

Also mfrs. of LIQUID Dairmol Antiseptic and Deodorant.

DALARE ASSOCIATES

23rd and Locust Sts. PHILADELPHIA 3, PA.

EXAMINATIONS

The Massachusetts Board of Registration in Veterinary Medicine will hold examinations for registration in this State on June 28, 29 and 30, 1956, at Amherst, Massachusetts. The latest date for filing applications is June 15, 1956. Address inquiries to Dr. Ray S. Youmans, Secretary, Board of Registration in Veterinary Medicine, Room 33, State House, Boston, Mass.

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Eli Lilly Acquires Common Stock of Corn States Laboratories

In an announcement dated April 4, 1956, Mr. Guy Williams, president of the Corn States Laboratories, Omaha, Nebraska, advises that Eli Lilly and Company of Indianapolis, Indiana has entered the veterinary supply field by acquisition of all of the common stock of Corn States Laboratories, Inc., of Omaha, and its affiliated interests.

Mr. Forrest Teel, executive vice-president of Eli Lilly is quoted in the announcement:

"Our plan will be to carry on the ethical business in veterinary biologicals so capably developed by Corn States Laboratories and to support energetically Corn States Laboratories with both our pharmaceutical and biological research and development staffs—the objective being to supply a line of high quality pharmaceuticals and biological products under the Corn States label for sale to and use by graduate veterinarians."

No change is contemplated in the administrative, production, sales and service staff of Corn States Laboratories, according to Mr. Williams. He added that the veterinary profession has gained a powerful ally by having the research facilities of the Lilly Company actively participating in resolving current problems of animal diseases.

FIVE SPECIAL FORMULAE

Prescription Diets

FOR DOGS and CATS

EFFECTIVE WHEN NUTRITIONAL THERAPY IS INDICATED

1. **p/d for Reproduction and Lactation**
2. **r/d for Obesity Correction**
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4. **k/d for Nephritic Conditions**
5. **c/d Special diets for Cats**

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HILL PACKING COMPANY, Box 148, Topeka, Kan.
Send information on therapeutic feeding ☐
Send information on other Hill products ☐

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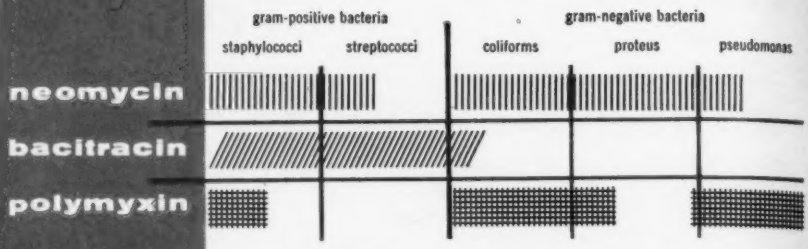
HILL PACKING COMPANY
P.O. Box 148 Topeka, Kans.

THESE ARE ANTIBIOTICS SPECIFICALLY FOR TOPICAL USE...



combined, these antibiotics cover the entire spectrum of bacteria most often found in topical lesions

THESE ANTIBIOTICS WORK BEST IN THE UNIQUE *Fuzene®* *base...*

The Fuzene base releases high antibiotic concentrations impossible with grease-base ointments

Comparative inhibition of Pseudomonas by Neo-Polycin (in the Fuzene base) and product A—a grease base ointment.

AND THESE ANTIBIOTICS *and the unique Fuzene® base* ARE AVAILABLE ONLY IN

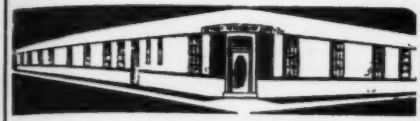
NEO-POLYCIN* 15 Gm. tubes
neomycin-bacitracin-polymyxin ointment

*Trademark

the ideal antibiotic ointment for topical use

PITMAN-MOORE COMPANY *Division of Allied Laboratories, Inc.*
INDIANAPOLIS 6, INDIANA

For the Veterinarian



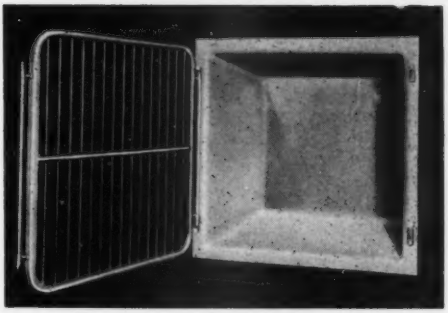
DETROIT VETERINARY SUPPLY CO.

DETROIT 32, MICHIGAN

Doctor Cassias Joins Edwards Veterinary Supply Co.

Dr. Charles S. Cassias, Colo., '38, joined the Edwards Veterinary Supply Co. as vice president on February 1, 1956.

Doctor Cassias operated the Waldo Animal Hospital, 8043 Wornall Road in Kansas City, Mo. from 1945 to 1954. For the past two years he has been connected with the Kansas State Board of Health. He will be traveling in the states of Kansas and Missouri as sales representative for his company.



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To maintain unrestricted milk flow and provide antiseptic protection is of first importance in the care of Injured teats, Scab teats, Stenosis, and in post operative therapy. Dr. Naylor Medicated Teat Dilators are SULFA-impregnated surgical dressings for the teat canal.

They act both medically and mechanically to provide prolonged broad spectrum germicidal activity and gentle non-irritating support to traumatized sphincter and teat mucosa. They promote normal tissue repair with a minimum of altered milking function of the streak canal. Positive retention — fit large or small teats.

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The soft, highly absorbent properties of Dr. Naylor Dilators make them an ideal vehicle for additional local medication of your choice. To obtain the synergistic bactericidal action of Antibiotics and Sulfathiazole following teat surgery, saturate with your favorite udder infusion antibiotic.

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the formation of the *Veterinary Sales Division* for the distribution and sale of Eaton specialty products for veterinary medicine.

The Veterinary Medical Division, staffed by graduate veterinarians, and the extensive research facilities of the Eaton Laboratories will supplement the Veterinary Sales Division.

For information or literature, please address your inquiries to Veterinary Medical Division, Eaton Laboratories, Norwich, N. Y.

In Canada: Austin Laboratories, Ltd., Guelph, Ont.

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FOR AVIAN HISTOMONAS INFECTION, HEXAMITIASIS, TYPHOID, PARATYPHOID, PULLORUM AND SYNOVITIS (ARTHRITIS OF CHICKENS) CAUSED BY FILTERABLE AGENT

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FOR TOPICAL APPLICATION TO FUNGAL INFECTIONS

An odorless, non-staining liquid containing Furaspor 0.4%, quaternary ammonium compound 0.5% and benzyl benzoate 15% in water-miscible vehicle.

Supplied: Bottle of 16 Fl oz.

Furacin Suspensoid Veteri

FOR PORCINE NECROTIC ENTE (SALMONELLA CHOLERAE

A water-miscible suspension o crystals 3.25% (1 Gm. per Fl istered by dosage syringe o

Supplied: Bottles of 16 F and 1 gal.

Eaton veterinary specialties are available through your Professional Veterinary Distributor

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FOR TOPICAL TREATMENT OF SURFACE LESIONS

Furacin 0.2% dissolved in a water-soluble base.

Supplied: Jars of 4 oz. and 1 lb.

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FOR TOPICAL TREATMENT OF SURFACE LESIONS

A water-soluble ointment containing Furacin 0.2%, butacaine 0.5%.

Supplied: Jar of 1 lb.

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FURACIN® (brand of nitrofurazone) is a wide spectrum bactericidal agent in appropriate formulations for topical application.

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FURASPOR® (brand of nitrofurfuryl methyl ether) is fungicidal and sporicidal in addition to its antibacterial activity. For topical application.

Furacin Solution Veterinary

FOR BOVINE MASTITIS, SPRAYING OR WET DRESSINGS

A water-miscible liquid of Furacin 0.2% in polyethylene glycol and water.

Supplied: Bottles of 500 cc. and 1 gal.

Furacin Soluble Powder Veterinary

FOR TOPICAL USE IN BACTERIAL EYE INFECTIONS AND OPERATIVE WOUNDS

A soft, water-soluble powder containing Furacin 0.2% in polyethylene glycol.

Supplied: Plastic "puff" bottle of 10 Gm.

Furacin Suppositories Veterinary

FOR GENITAL TRACT INFECTIONS OF LARGE ANIMALS

...Furacin 0.4% in a water-soluble ...which melts at body temperature. Now hermetically sealed.

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FOR TREATMENT OF BOVINE MASTITIS

A suspension of Furacin 2% and procaine penicillin G (13,333 units per cc.) in peanut oil with aluminum stearate 3%.

Supplied: Rubber capped vial of 100 cc., box of 12 applicator tubes of 7.5 cc.

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FOR BACTERIAL OTITIS

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the dog food with

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Ideal is the perfect nutritional supplement to your dry food. It is a formulated, uniform product, unlike other supplements that vary from can to can. When you use Ideal you know *exactly* what you are feeding—and the food value never varies.

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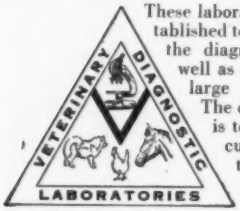

These laboratories have been established to aid veterinarians in the diagnosis of obscure as well as common ailments in large and small animals. The chief aim of our staff is to give quick and accurate diagnosis at all times.

Our service includes fecal examinations, anti-biotic sensitivity tests, urinalyses, blood counts, tissue sections, bacteriological cultures, cultures for ringworm and blood chemistry. It is designed to assist owners and breeders of stock of all kinds including dogs, cats, horses, cattle, poultry, hogs and sheep.

Sample containers and price list on request.

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MEETING CALENDAR

Eastern Iowa Veterinary Association 22nd Annual All-Day Practitioners' Clinic. Hawkeye Downs, Cedar Rapids, Ia., May 8, 1956. Forrest E. Brutsman, Tracy, secretary.

American Animal Hospital Association. Annual meeting. Hotel Fontainebleu, Miami Beach, Fla., May 23-26, 1956. W. H. Riser, 5335 Touhy Ave., Skokie, Ill., executive secretary.

Georgia Veterinary Medical Association. Annual meeting. General Oglethorpe Hotel, Savannah, June 10-21, 1956. C. C. Rife, 505 Lindbergh Dr., N. E., Atlanta.

Wyoming Veterinary Medical Association meeting. Masonic Hall, Pinedale, June 9-10-11, 1956. J. F. Ryff, P. O. Box 960, Laramie, secretary-treasurer.

California State Veterinary Medical Association. Annual Convention. Hotel Statler, Los Angeles, June 11-13, 1956. Charles S. Travers, 3004 16th Street, San Francisco, executive secretary.

Vermont Veterinary Medical Association. Annual Summer Conference. The Lodge at Smuggler's Notch, Stowe, Vermont, June 21-22, 1956. A. E. Janawicz, Department of Agriculture, Montpelier, secretary.

Michigan State Veterinary Medical Association. Annual meeting. Bancroft Hotel, Saginaw, Mich., June 21-22, 1956. Paul V. Howard, 4011 Hunsberger, N.E., Grand Rapids, secretary.

North Carolina Veterinary Medical Association. Annual meeting, Greensboro, N. C., June 25-27, 1956. C. J. Lange, 3741 Hi-Pt. Rd., Greensboro, secretary-treasurer.

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Maritime Veterinary Associations. Joint conference. June 26-28, 1956, Mount Allison University, Sackville, New Brunswick. J. F. Frank, Sackville, secretary joint committee.

Maryland State Veterinary Medical Association. Annual summer meeting. George Washington Hotel, Ocean City, Md., June 28-29, 1956. John D. Gadd, Cockeysville, secretary.

Mississippi State Veterinary Medical Association. Annual meeting. Buena Vista Hotel, Biloxi, Miss., July 15-17, 1956. Harvey F. McCrory, Box 536, State College, Miss., secretary.

Iowa State College Annual Conference for Veterinarians. Memorial Union, Iowa State College, Ames, Ia., July 17-18, 1956. Drs. John B. Herrick and D. L. Baker, chairmen.

Virginia Veterinary Medical Association. Semiannual meeting. Natural Bridge Hotel, Natural Bridge, Va., July 17-19, 1956. Wilson B. Bell, 1303 Hillcrest Drive, Blacksburg, secretary.

Alabama Polytechnic Institute Annual Conference for Veterinarians. School of Veterinary Medicine, Alabama Polytechnic Institute, Auburn, Ala., July 22-25, 1956. R. S. Sugg, dean.

Pennsylvania State Veterinary Medical Association. Annual meeting. Bedford Springs Hotel, Bedford, Pa., September 12-14, 1956. Raymond C. Snyder, N.W. Corner Walnuts St. and Copley Rd., Upper Darby, Pa., secretary.

Washington State Veterinary Medical Association. Annual meeting. Davenport Hotel, Spokane, Sept. 21-22, 1956. P. J. Pfarr, 6306 N. Wall, St. Spokane, general chairman.

Oklahoma Conference for Veterinarians. School of Veterinary Medicine, Oklahoma A & M College, Stillwater, September 27-28, 1956. A. L. Malle, Department of Veterinary Pathology, chairman.

American Veterinary Medical Association. Annual meeting. Municipal Auditorium, San Antonio, Tex., October 15-18, 1956. J. G. Hardenbergh, 600 S. Michigan Ave., Chicago, Ill., executive secretary.

Eastern Iowa Veterinary Association. Annual meeting. Hotel Montrose, Cedar Rapids, Ia., October 4-5, 1956. Forrest B. Brutsman, Traer, secretary.

United States Livestock Sanitary Association, 60th annual convention, Hotel Morrison, Chicago, Ill., Nov. 28-30, 1956. Dr. R. A. Hendershott, 33 Oak Lane, Trenton 8, N. J., secretary.

In Arizona . . .

Ninety percent of the members of the Arizona Veterinary Medical Association have enrolled for the Nation-Wide Silent Partner Income Protection Plan provided by Continental Company.

Arizona is the first of the states with small veterinary population to qualify for group insurance coverage under the Nation-Wide D.V.M. Silent Partner Plan offered by Continental Casualty Company.

By this action, members of the Arizona association have provided complete, clear coverage, free of all restrictive riders and elimination waivers, regardless of past medical history of the applicant.

Continental Casualty Company has wisely made provision for such enrollment for all states including those heretofore denied group insurance coverage because of the small number of veterinarians located in such states.

Following action of the National Committee on Insurance, all active veterinarians up to age 70 who qualify have now been provided for. The continuation of this sound program for members of the veterinary profession depends upon the veterinarians themselves. If they value sound income protection insurance, continued progress in this important field may be expected.

State veterinary medical associations owe it to their members to accept and sponsor this dependable insurance coverage. The Nation-Wide D.V.M. Silent Partner Income Protection Plan by Continental Casualty Company is now offered in 46 states of the nation.

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Veterinary Department

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Dr. James Scatterday, Florida State Board of Health has reported two cases of nitrite poisoning in children resulting from the ingestion of raw wieners. The local physician making the diagnosis reported symptoms of sudden onset and cyanosis and shock from anoxia within 3 minutes to one hour after eating the prepared sausage. Analysis of gastric contents and vomitus indicated excessive concentrations of nitrites.

Sodium and potassium nitrites and nitrates are permitted to be used in the preparation of meat and meat products in quantities not to exceed 200 parts per million of nitrite in the finished product. They have been used traditionally in the preparation of that class of products usually referred to as being cured. Beyond these established levels they are potentially harmful.

Federal meat inspection regulations require that these salts be "kept securely under the care of a responsible employee of the establishment." Maximum amounts of sodium or potassium nitrite allowed is ¼ oz. per 100 lb. of chopped meat.

▾ ▾ ▾

Hog cholera antiserum varies in antibody titer to *Leptospira pomona* from 1:200 to 1:2000.—*W. L. Sipple, D.V.M.*

Most recent report of incidence of bovine brucellosis compiled from reports from wide areas indicates a considerable reduction; perhaps as low as 1.7%.

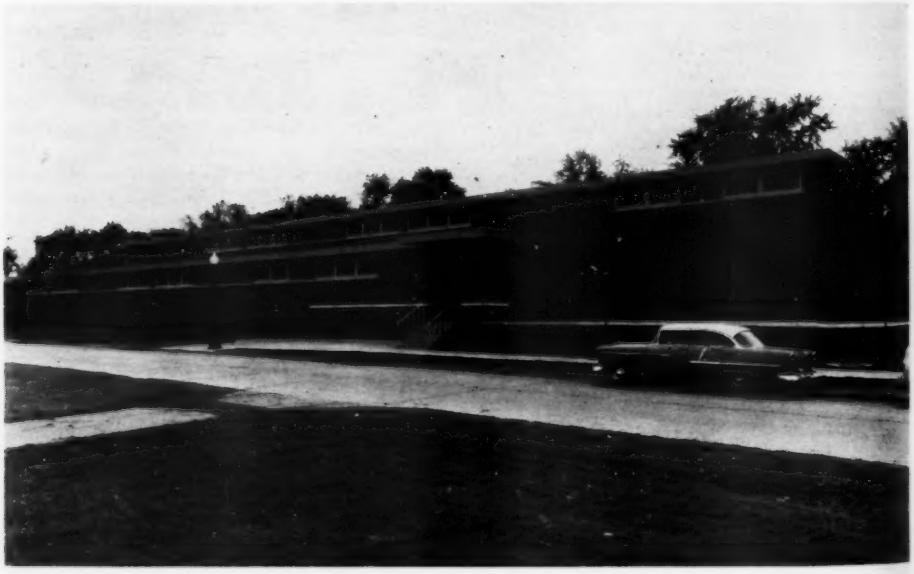
▾ ▾ ▾

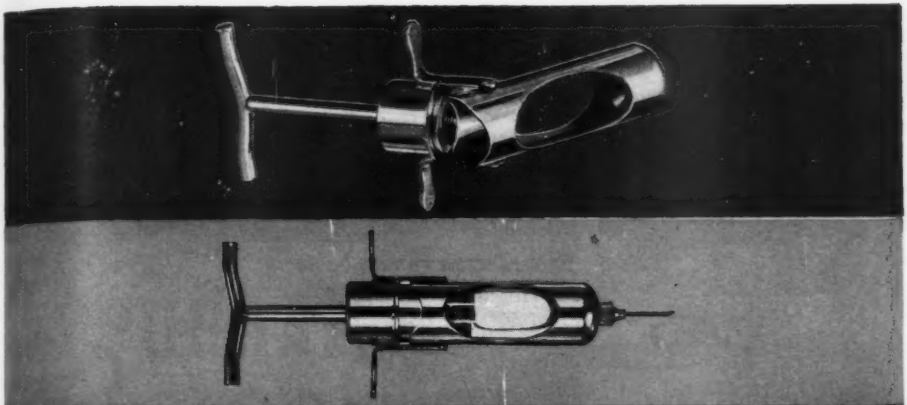
New Large Animal Clinic at Illinois

The new Large Animal Clinic Building (pictured below) marks another milestone in the development of education at the College of Veterinary Medicine, University of Illinois, Urbana. This utilitarian building as an addition to the physical plant is expected to aid the clinical staff in training details. Dr. L. E. Boley is head of the Clinical Department which will occupy this new facility.

Measuring 78 ft. by 250 ft., the two story structure is designed to accommodate 50 large animal patients. Interior of the main section includes a modern surgery finished with green ceramic tile walls and equipped with a floor-level hydraulic operating table; auxiliary rooms are adjacent. Two hallways extend through the building from the tiled lobby, on both sides of which are generous, heated, box stalls.

Dean Robert Graham has noted that the number of animals treated in the Veterinary Clinic has increased each year since activitation of the College in 1948. During the past fiscal year, 18,144 animals were treated, including 14,332 cattle, hogs, sheep, and horses, and 3,650 dogs and cats.





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With the AUTOJET you simply break the back of the syringe, insert cartridge and the AUTOJET is ready for use. After vaccination, discard old cartridge and repeat process for next injection. In addition to use with Alogen and Alogen H, the AUTOJET syringe is adaptable to smaller cartridge vials of Alotab (Feline Distemper Vaccine).

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ALOGEN-H—Canine Distemper and Infectious Canine Hepatitis Vaccine in Bronchisepticus-Streptococcus-Typhimurium Bacterin.

ALOTAB—Feline Distemper Vaccine.

Alogen, Alogen H, and Alotab come in disposable cartridges that are **usable in the AUTOJET syringe or with old-fashioned syringes just as you would any other vial.**

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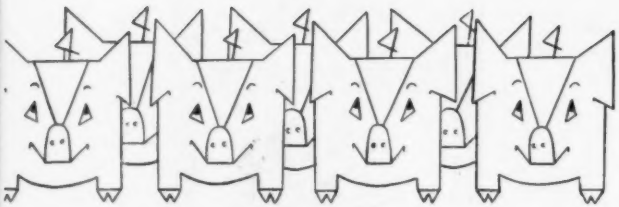

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